The Mining Journal

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Editor
U. Baliol Scott
Deputy Editor
A. Graham Thomson
Assistant Editor
R. Bowran

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

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A Carrot for Mexicanization

THE new Mexican mining law came into effect on April 20 putting an end to a long and dreary period of uncertainty. The original draft of the legislation last year aimed at nothing short of nationalization of mining enterprises. Wiser counsels prevailed, however, and nationalization was modified to Mexicanization which means in effect that mines must be operated by companies incorporated in Mexico and at least 51 per cent of the voting strength of those companies must be in the hands of Mexican nationals. To the extent that the law as it now stands does not slam the door on foreign mining interests, it is a hopeful sign even though its intent is virtually; Mexicanize, or else.

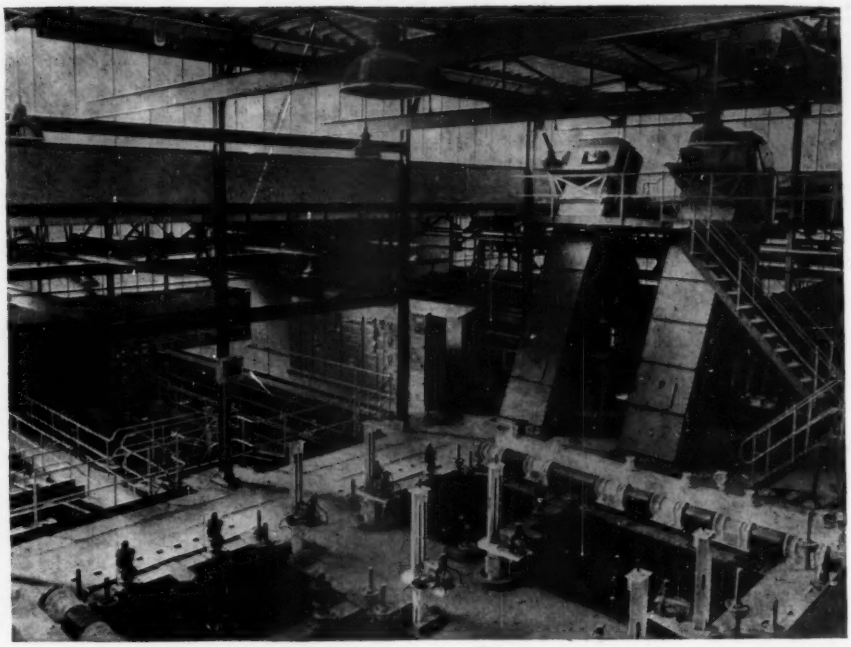
The final outcome of Mexican government policy is not as some people had hoped, somewhere mid-way between the vacillating policies enunciated just over two years ago (*Mining Journal*, May 8, 1959, p.493) when Senor Bustamente, the Minister for National Resources, advocated state control and the absolute prohibition of future concessions to foreign companies, while Senor Salvador Pena, Under-Secretary of Non-Renewable Resources implied that legislative changes would be based on the principle that "whoever acquired the right to exploit a mineral deposit would be required to act on it".

For nationals of any country to aspire to a larger ownership of the equity of foreign owned companies operating in their industries is understandable. In varying degrees it manifests itself in advanced as well as in less developed countries. In Canada, many Canadians feel in deep grievance against the inroad of American capital and ownership into their basic industries but financial control of U.S. owned companies by Canadians has never been put forward in a legislative programme. Further afield, the Indian government has compromised on reasonable shares of the equity of foreign companies, and more to the point, a reasonable ratio of nationals employed. A fair and reasonable share is one thing, complete Mexican control is quite a different matter which is what Mexicanization means.

Briefly, the new mining law prohibits the acquisition of new mining claims by foreign controlled companies. Existing companies, although they will be unable to acquire new claims, at any rate will be allowed to continue operations of their present concessions for the next twenty-five years, but they will not be entitled to any assistance in the form of subsidies, tax rebates and so on, and could find themselves in difficulties over such matters as export permits.

What it amounts to is this. Foreign owned companies, mostly American which hold about 85 per cent of Mexico's mining investment have really no alternative but to resign themselves to the fact that unless they sell a controlling interest to Mexicans, their future operations in Mexico, if not ruled out on economic ground, will be difficult, to put it mildly.

The top floor of the new 500 t.p.h. Baum plant built for the National Coal Board at Killoch Colliery. Photograph by kind permission of National Coal Board.



COAL PREPARATION STARTS WITH

SCIENCE

Taking a sample of the dense medium in the Simon-Carves dense medium pilot plant.

The success of the current modernisation policy demands that installations serving the new high-output mine shall be of the highest technical, mechanical and structural quality. This is particularly true of the coal preparation plant, for breakdown or inefficiency there cannot be tolerated if outputs are to be maintained. In the Simon-Carves research and development plant a large staff of scientists and engineers is constantly proving new developments in coal preparation technique. Only facilities such as these, backed by fifty years experience of the business, can provide the vital mastery of the art of coal preparation so necessary to modern mining economy. Facilities like these mean plants like this.

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New mining concessions will only be granted to companies in which Mexicans own 51 per cent or more of the equity. The real incentive, however, to Mexican investment in foreign owned mining companies lies in the tax concessions offered. Thus, Mexicanized companies will be entitled to a 50 per cent rebate of the Federal government's (90 per cent) share of the revenue from production and export taxes, but any increase in profits as a result of this concession will still be subject to Mexican income tax. Should a company decide to sell, by placing or negotiating with Mexican bankers, the requisite number of its shares — and all the largest companies are taking steps to do so—it can then file proof that a 51 per cent of its capital is held by Mexican nationals as at September 1 in any year when it will be entitled to a concession on production and export taxes as from the following January 1. These taxes amount to about 30 per cent of the value of the product.

Some American mining companies are concerned that no mention has been made in the new legislation of the *ad hoc* fiscal agreements under which they have been operating in the past. Hitherto, annual arrangements have been negotiated between the Mexican government and certain mining companies regarding rebates that have been as much as 75 per cent, depending on local costs. Without these rebates, according to a spokesman of one of these companies, the 30 per cent production and export tax would have made operations unprofitable.

About 14 American firms are at present operating in Mexico but the only large-scale British mining interest is that of San Francisco Mines of Mexico which mines gold, silver, lead, zinc, copper and is shortly to produce fluorspar concentrates as well. San Francisco already has a Mexican subsidiary company and the directors of the parent company have received permission from the Treasury and the Bank of England to make a transfer to a Mexican incorporated company. Permission for the transfer has also been sought from the Department of External Relations in Mexico.

While some of the American companies have expressed their discontent with the new legislation the majority of large companies have quietly resigned themselves to the new situation. A group of Mexican investors has already acquired the controlling interest in two Mexican subsidiaries of American Metal Climax, according to a report from Mexico City. The subsidiaries are Compania Minera de Penoles SA and Compania Metalurgica Penoles SA which own and operate mines in Northern Mexico, a lead smelter in Torreon and a lead refinery in Monterrey. The two concerns are being consolidated into a new Mexican controlled company, the Compania Metalurgica Mexicana Penoles SA, according to Senor Raul Bailleres who heads the group of Mexican investors. Dow Chemicals are engaged on similar moves for their fluorspar mining operations; Continental Ore Corporation is another.

Because of the preponderance of American owned mining companies in Mexico, the Mexican government no doubt feels that it can take a tough line, both politically and fiscally, since it is well aware of the many factors which predispose Americans to invest in Mexico. Primarily it is adjacent, which means low transportation costs of products and equipment, Mexican wages are low, and there are large relatively unexplored areas where there is little or no competition.

Mexican nationalism, of course, is the driving force behind this latest move. Casting their eyes around the world, the Mexicans perhaps feel that their policy, measured by what has happened elsewhere, is a moderate one, even though they drive a hard bargain. While the response of the Mexican investor is the limiting factor in the first place, the success of the government's policy in the long run will depend on the progress of Mexican nationals in acquiring know-how and skill in running, or helping to run, the mining companies they come to control financially.

Whether or not the Mexican government has gone too far remains to be seen, but the limiting factor will be the willingness of Mexican nationals to invest in the mining industry, and that in turn will depend on the succulence of the carrot dangled before them in the shape of tax concessions to Mexicanized mining companies and, incidentally, on assurances that the Mexican government will not suddenly change its legislation next time it has a balance of payments crisis on its hands.

SELANGOR NATIONALIZATION HINT

Selangor, the second largest tin producing State in the Federation of Malaya, will only grant mining leases to foreign applicants when no application has been made by a Federal citizen, declared the Mentri Besar, Dato Abdul Bakar bin Bagenda, in the State Legislative Assembly on April 14.

He was speaking during the debate on a two-part resolution moved by a Socialist Front member: "That no more mining leases be given to foreign firms and that all future mining leases be given out to local citizens or local firms formed with local capital", and that "All mining leases must be subject to the condition that the mining concerns shall provide fundamental facilities and service gratuities and also pensions for employees". The motion was seconded by another Socialist Front member, who emphasized the need for Malayans to control the tin industry.

The Mentri Besar, opposing the resolution, said that it was redundant as the Selangor State government had already adopted the policy that all future mining leases should be given to Federal citizens, but that an exception could be made in cases where no Federal citizens apply for the mining leases due to economic or other reasons. In such cases mining leases are given to non-citizens. It was not the government's intention to cut short, before they expired, the mining leases already given to non-citizens, he explained.

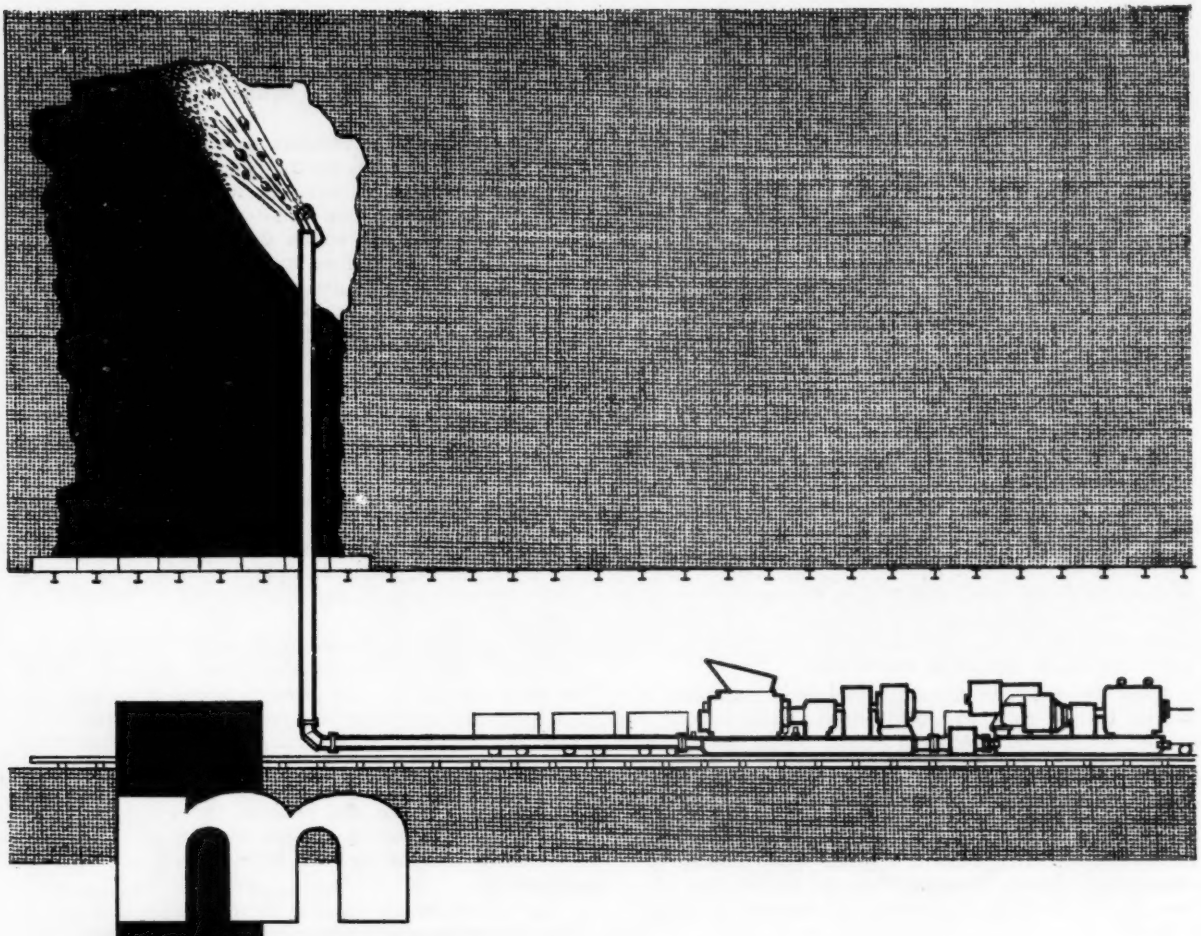
He agreed that there must be economic independence but although there may be a feeling of being exploited, foreign capitalists could not be driven out all of a sudden.

The Minister then made this significant statement: "We must be very careful in our action. If we are to nationalize foreign enterprises overnight, there would be chaos. We should not hurt the feelings of other people because when they first came to Malaya they did not take our things by force.

"They obtained them according to the laws of the country. Now we must treat them the same. There had been nationalization of foreign-owned enterprises in our closest neighbour. The result was chaos".

Dato Abu Bakar dismissed the second part of the resolution by saying that gratuities and pensions for all mine workers was not a responsibility of the State government. There were trade unions to look after the interests of the workers. An Independent member said that adoption of the resolution would tend to restrict mining operations, and urged that government should make it easier to get mining lands.

The mover of the resolution, in closing the debate, pointed out that he had not touched on the question of



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nationalization, but that that subject had been brought up by the Mentri Besar.

Although the motion was defeated, the large British, American, Australian and French tin mining companies, whose capital investment and enterprise has been largely responsible for making Malaya one of the most economically advanced countries in Asia, will gain little comfort from the statement of the government's policy towards them.

In Malaya the State governments are autonomous in land administration, although since January, 1956, there has existed a National Land Council with the object of co-ordinating land leases and administration throughout the eleven States. Little has been heard of this Council during the five years it has been in existence. Is this an indication of the attitude of State governments to any attempt at dictation by the Federal government on matters which they regard as their prerogative?

Another pointer that the State government is not in sympathy with the Federal government's declared policy to increase the competitiveness of the tin mining industry in Malaya is the disclosure by the Senior Inspector of Mines in Kuala Lumpur on April 17 that all tin mining in the Templer Park area is to cease by 1970. He stated a tin mine now operating there has been given nine years in which to surrender its lease. The State government has declared the area as a botanical reserve. In consequence of this policy three Chinese mining concerns who had applied for prospecting permits there have had their applications refused. When the area was closed to mining in 1949 because of the activities of Communist terrorists there were 18 gravel pump mines operating in the area now banned to miners to make way for botanists.

The Federal government's Second Five Year Plan expects an increase in tin production by 1965 of some 8 to 10 per cent over 1960 production. It would seem that this modest prediction is unlikely to be achieved unless other State governments display a more responsible attitude towards alienating land for land hungry tin miners than that now being displayed by the State government of Selangor.

RAILWAY COMPANY INITIATES MINERAL EXPLORATION

Usually the exploitation of new mineral deposits is dependent on the provision of transport facilities and railway companies, or governments if they are nationalized, often take a long time to win over. It is a rare occurrence for a railway company to take the initiative in mineral development but that is what has happened in Canada.

The Algoma Central and Hudson Bay Railway is to undertake mineral exploration and evaluation of the lands served by its lines in the hope of creating new and additional traffic. How this will be done and what is involved was described in a paper jointly presented by Mr. D. E. Smith and Mr. D. H. James of Franc. R. Joubin and Associates, the company's consultants, at the 29th Annual Convention of the Prospectors and Developers Association held in Toronto on March 5-8. Franc. F. Joubin and Associates will carry out geological mapping, evaluate mineral showings, prepare maps and prospect. While, of course, the company hopes itself to make an important mineral find, all data compiled will be made available to interested individuals and mining organizations with the object of attracting them into the area.

The Algoma Central line extends northward from headquarters at Sault Ste. Marie, a track distance of about 300 miles, to Hearts on the C.N.R. north line. It crosses the C.P.R. main line at Franz and the C.N.R. main line at Oba, while from Hawk junction a branch line extends 26 miles westward through Wawa to Michipicoten Harbour where the company owns and operates an ore loading dock as well as dock facilities at Sault. Ste. Marie. It also owns and operates bulk carrier vessels on the Great Lakes.

The southern line runs roughly parallel to the east shore of Lake Superior. No point on the whole network is more than 150 miles from the Great Lakes or the St. Lawrence Seaway, and the total area covered is about 5,000 sq. miles.

After many constructional and financial setbacks the railway was completed in 1914 and operated under difficulties until 1940, when traffic from the Helen iron mine at Wawa not only turned the tide but made the company aware of the value of the mineral industry business in the area. The railway system was re-vitalized and modernized and in 1952 become the first all-diesel system in Canada.

The Algoma Central owns mining and other rights to 38 entire townships, part of the original land grant offered to the rail to assist its construction. These townships are administered by the railway through a mines department which issues prospecting permits and records claims staked. Its regulations differ from those in force on Crown lands in Ontario in two important respects: the railway may from time to time withdraw part of its lands from staking although it does not affect any prior claims and operates for limited periods only; secondly, claims can be taken to 99 year lease rather than patent. In the event of production a royalty is payable to the railway ranging from one to 2 per cent of annual profits.

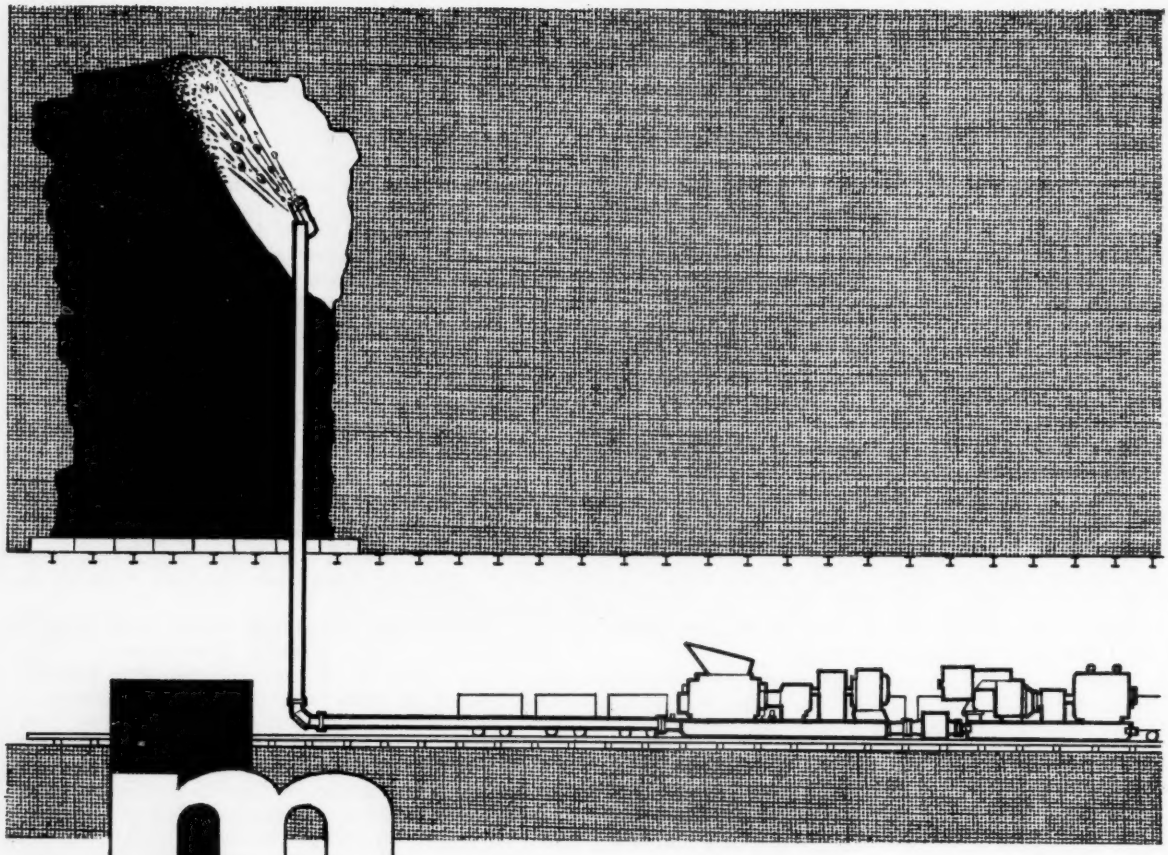
Iron ore deposits in the area have been well studied and among them are the Helen and Sir James siderite mines and the Goudreau pyrite mine owned by Algoma Steel. Gold is distributed in the Michipicoten and Goudreau areas while there are showings of copper, nickel, lead, zinc, silver and molybdenum in the Hawk Junction area, and of copper, cobalt, zinc and lead just to the north of Sault Ste. Marie.

WESTERN SAHARAN IRON ORE HOPES RISE

Coinciding with the news of the manganese potential in Brazil come optimistic reports from the Western French Sahara about the huge deposits of iron ore at Gara Djebilet, near Tindouf. Reserves have been estimated at around 3,000,000,000 tons of varying grades. It is also reported that in the west section of the deposit some 200,000 tons of ore with a 58 per cent Fe content is not far below the surface which is in addition to the 450,000 tons with a 57 per cent Fe content already known.

S.E.R.M.I. in which the French State Agency, the Bureau d'Investissement En Afrique, has the controlling interest, has been prospecting in the area, and has just been granted a concession of 1,500 sq. km.

Before commercial exploitation can begin, however, a railway of about 250 miles must be constructed from the ore field to the coast but political snags arise as it would have to pass through Morocco or through the Spanish Sahara. Furthermore, a market for some 4,000,000 or 5,000,000 tons of ore annually must be found but this is thought to be less of a problem since the extra supplies would no doubt be welcomed by European steel industries.



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L.M.E. Views on Metal Marketing

THE occasion for a particularly succinct presentation of London Metal Exchange thinking on current marketing problems was provided by the dinner held at the Savoy Hotel last Tuesday to mark the reconstruction of the Metal Exchange building.

Responding to the toast of "The London Metal Exchange" which had been proposed by the chief guest Mr. Iain Macleod, the Colonial Secretary, Mr. Philip G. Smith, chairman of the committee of the London Metal Exchange, said the renovation of the Exchange had taken place at an extremely interesting time. Up until the Second World War it was the general opinion that in fixing the prices of metals the law of supply and demand must be allowed to operate, but since then it had become generally accepted that it was possible, not to do away with that law, but at least to control its more violent movements.

"People have realized that to have prices which are too low not only harms the economy of the countries which produce these metals, but also extends throughout the whole world and, in fact, finally lessens the volume of world trade altogether. Whilst at the other end of the bracket too high prices lead to substitution, and this in turn leads to a slowing down in the natural rate of increase in the consumption of these metals. As production is increasing, so consumption must increase and therefore one of the things we have to do from our point of view is to see that prices don't go too high."

Experiments in Control

The realization of this fact, said Mr. Smith, had led to a number of what he called "very interesting experiments". "We have an International Tin Council and a Lead and Zinc Study Group held under the auspices of the United Nations. In copper we have periodic meetings between the producers and consumers. All these various methods whereby attempts are being made to control the law of supply and demand, have now been going on for some little time and I think we have now reached a stage where we can draw a few deductions from the experience we have got".

The first deduction was that no agreement was likely to be successful unless it had the active support of the majority of the producing countries — "that is, tonnage wise"—and the sympathy of the remainder and also the good will of the consumer.

The second deduction, said Mr. Smith, was that we had learned that if we were going to cut back production—or what some people preferred to call its availability—then there was really only one effective way of doing that—by leaving unwanted metal in the ground.

The third and most important of the various lessons we had learned was the importance of timing.

"It is so important when one is going to introduce restrictions or relax restrictions to do it in good time. It is at this point that the London Metal Exchange commences to play one of its outstanding roles."

The London Metal Exchange gave a trend and it was only by a very close study of statistics in conjunction with the trends of prices given in London that people could determine with any degree of intelligence when restrictions should be imposed or when they should be taken off.

"The committee of the exchange is very well aware of this, and we are continually reviewing all the various standard contracts which we have in order to keep them up to date and also giving very serious consideration to suggestions and proposals which come to us."

In the foregoing context, said Mr. Smith, he would like to touch on two of the proposals which came forward from time to time.

"The first is that we should extend the period of dealing from three to six months. A committee has considered this, and considered it at intervals, but the majority opinion still is that any advantages which might be gained would be far outweighed by the disadvantages, and this is not including the fact that if we are to extend the dealings we should have to reorganize the whole internal settlement of the market.

"My own opinion is that if we allow the dealings up to six months we should get a very great amount of speculation, and this speculation would probably cloud the very trends that we are trying to present to the world to enable the metal trade to be carried on more efficiently.

"The second proposal often brought up is a request for the introduction of a second contract on certain grades of one of the metals in which we deal. Here again this is a matter which is discussed, but again I must say that the majority of the committee feel that if we have two standard contracts for one particular metal, then the results would again lead to confusion and would again prevent the Exchange from fulfilling one of its functions. But I would like you also to believe that the committee is aware of technical improvements in smelting and refining and that also we are well aware of the requirements of consumers who also seem to want metal of greater purity than they wanted one year ago. Therefore it may be—and I personally think it will come about—that in time the grade of metal delivered against standard contracts will in itself be raised to take into account some of the ideas and some of the reasons why a second contract is now asked for."

Free Trading Essential to Stability

Apart from the Metal Exchange, there was one main difficulty in this business of guessing the trends or interpreting the trends produced by the London prices. That was the building up of surpluses or deficiencies which sometimes took place in various countries due to restrictions and other hindrances to free trade.

"I would ask you all to impress those in authority that all types of interference with the free flow of metals in the world is detrimental. I think we should try to get rid of quotas; that we should try to have abolished imports and export licensing systems. I think that where tariffs remain necessary they should be kept at as low a level as possible and that we should all try to keep all government interference in whatever form out of our industry.

"I think we have a task to perform here, because I am quite convinced that if we could make the metal flow more freely, surpluses would become apparent very much more quickly and deficiencies more noticeable very much more quickly. Therefore all these attempts being made to control the law of supply and demand will be made at the correct time and will therefore be efficient and will not (repeat not) be detrimental to the trade as a whole and to the Metal Exchange in particular.

"I am quite confident that so long as the Metal Exchange remains up to date, so long as we examine all new ideas, the Exchange will remain in its place in the world. The prices it produces will remain based on the majority of international transactions outside the dollar area and the prices we produce will be of use and guidance to the world as a whole."

London Metal Exchange Gets a New Look

THE London Metal Exchange premises in Whittington Avenue, which have undergone their first major reconstruction since they were built in 1882, will be officially re-opened today by Sir Bernard Waley-Cohen, the Lord Mayor of London.

It is nearly 100 years since metal merchants, trading in coffee houses and at the Royal Exchange, decided to organize their business on a more formal basis. As a result the Metal Exchange was set up in Lombard Court in 1877 and transferred to Whittington Avenue in 1882.

As can be well imagined in such antiquated premises members have long suffered from inadequacy of space—a situation which has become constantly aggravated by the increasing demand for telephone facilities — inadequate lighting, both artificial and natural, and an antiquated and inefficient heating system. But perhaps the worst defect was the unsatisfactory acoustics, a serious drawback as trading is effected by open outcry across the " ring ".

The reconstruction of the Exchange has remedied these defects, acoustics and telephone facilities are now up to modern standards and there is a new heating sytem.

Fortunately the most prominent of the traditional features of the Exchange — the ring itself — consisting of four long curved benches arranged in a circle, has been retained, but elsewhere the reconstruction has had to be more thoroughgoing than had been intended, for aesthetic reasons. The ring appears solid enough to remain the centre of the Exchange for at least another 80 years. Among the many innovations is a lamp-signalling device which automatically informs members or their clerks of telephone calls. Each member-firm has an illuminated number visible from the ring.

The new system by-passes the switchboard which previously had to deal with 60 extensions, and during trading sessions, when all the telephones are in constant use, the switchboard used to be continually swamped by calls.

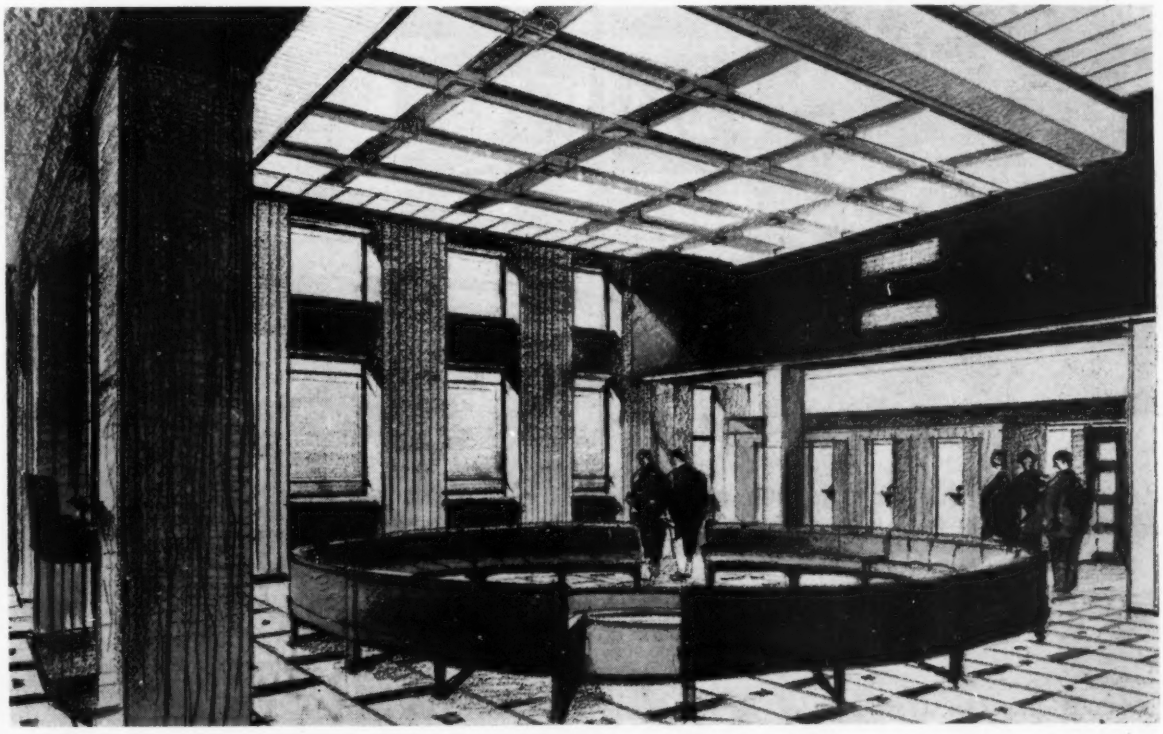
The telephone booths have been re-arranged to bring them nearer to the ring. The continual demands for more extensions had lead over the years to many being sited in rather inaccessible positions, making it difficult for dealers and clerks to keep their offices and clients in close contact with the movements of the market.

The re-siting of telephone extensions was completed in two stages. The extensions had to be first moved into temporary positions so as not to interefere with building operations, and then moved to their new permanent positions. Both operations had to be performed during non-trading periods as it is imperative to have all telephones available during sessions.

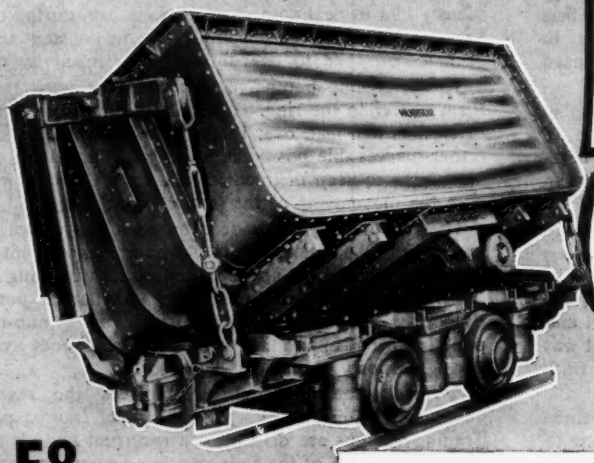
A clock-controlled system replaces the manually-operated push-bell to indicate the end of trading periods. Trading sessions are divided into recurrent periods of five minutes for each of the four metals—copper, tin, lead and zinc. As an active session can be extremely noisy, it was not uncommon for a dealer in the heat of the moment to miss the signal for the end of a period and attempt to continue to trade in the previous metal. (By tradition such " offences " cost the dealer 2s. 6d.)

The new system to indicate the end of a trading period comprises a master clock controlling a number of " slave " clocks. (At least one clock is visible from any part of the Exchange). The master clock also controls a " programme instrument " which indicates by means of a bell the beginning and end of each five minute trading period.

Artist's impression of the main trading room in the London Metal Exchange. The Ring, where trading takes place, remains the same as it was in 1882 when it was installed. The surrounding room has been completely modernized



MINE CARS



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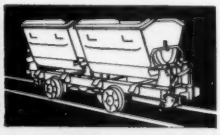

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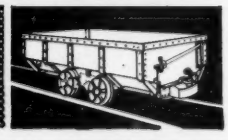

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RH10/1

South Africa's Quest for Higher Labour Efficiencies

This article will be of particular interest to the followers of the South African scene. It discusses the suggestion made in this week's supplement that it may soon be necessary to augment the conventional gold share classification with a further classification on the basis of the degree to which the particular mine may prove amenable to higher labour efficiencies

WITH the prospects of any rise in the gold price now more remote than for some time past, it is inevitable that the South African gold industry's attention will be focused more closely than ever on the problem of off-setting, through yet more efficient operation, the rise in mining costs induced by the familiar inflationary process.

It is possible also that South Africa's present, and as we all profoundly hope temporary, political isolation may result in a much increased pressure on the gold mining industry to maximize its rate of current gold production, both as an off-set against the drying up of new foreign capital investment in the Union and also (if other measures prove insufficient) to help in the stabilization of her balance of payments.

The principal key to the solution of these twin problems of lower costs and higher output lie in more efficient labour utilization. In the case of the newer mines which have started up within the past 20 years or so, labour costs tend to represent about 45 per cent of total costs of which two thirds are European and one third African. In the older mines the percentage is often higher. Not only is labour thus the largest item of mining cost, but it is also the one which would appear to offer the greatest scope for economy and on which the industry's attention is consequently becoming increasingly centred.

This point is clearly brought out in the accompanying table showing the tons hoisted per year per African and per European at most of the post war mines, on the basis of the latest available annual reports.

It must, however, be stressed that these widely varying figures should be read with considerable reservations, mainly related to the varying depths at which mining is being carried out and also the mining conditions themselves (e.g. to the degree of faulting in the reef, stope width, roof conditions etc.). Some attempt has been made to evaluate these factors in the first two columns of the table, but again it must be read with reservations as the lease area of any given mine is far from uniform, either in depth or character.

Even so, after making allowance for these variations, it would still seem as if we must look further for a complete explanation of the differences in labour efficiencies, which in turn means in labour costs. In fact, labour costs can be, and in some mines already have been, reduced in two general directions. In the first place the output per man shift can be improved by increasing the efficiency of existing operations and secondly, in some cases at least, can be increased by concentrating the mining areas and in others by increased mechanization.

Improving Actual Labour Efficiencies

Notwithstanding the considerable amount of excellent work which has already been done in this direction on some mines, there is considerable scope for obtaining higher efficiencies from further training both of European and African workers although under existing trade union agreements it is in the latter direction that the greater possibilities for economy exist. We are, therefore, not considering in this context the possibility of training Africans for up-grading to more responsible jobs or to fragmented jobs such as has been the case on the Copperbelt, as this would be contrary to the job reservation agreements which are in force with the European unions.

Mine	*Approx. depth of current mining (ft.)*	*Mining conditions*	*African Employees*	*European Employees*	*Tons ore hoisted per year (000)*	*Tons hoisted per year per African*	*Tons hoisted per year per European*
Blyvoor	5,000	A	8,585	1,191	1,819	212	1,527
Doornfontein	5,000	A	6,080	768	1,670	275	2,175
F.S.C.	5,000	C	7,427	686	1,137	153	1,657
Harmony	5,000	A	9,466	1,130	1,857	196	1,643
Harties	6,000	B	8,848	1,192	1,712	194	1,436
Libanon	4,000	A	5,703	827	1,534	269	1,855
P. Brand	4,500	B	8,092	767	1,513	187	1,973
P. Steyn	5,500	B	8,571	1,014	1,474	172	1,454
St. Helena	4,000	B	7,620	747	1,751	230	2,344
Vaal R.	5,000	B	7,752	713	1,721	222	2,414
Venterspost	5,000	B	7,136	984	1,692	237	1,720
Welkom	5,000	B	7,814	798	1,280	164	1,604
W. Drie	5,500	A	8,120	1,057	1,886	232	1,782
W. Holdings	4,000	B	7,829	710	1,797	229	2,531
W. Reefs	4,000	B	8,814	1,055	1,877	213	1,779
Winkels	3,000	C	4,053	449	945	233	2,105
					Average	214	1,875
					Lowest	153	1,436
					Highest	275	2,531

A = long wall face possible
B = long wall face mostly impractical but high speed advance on short faces possible
C = most forms of concentrated mining impractical

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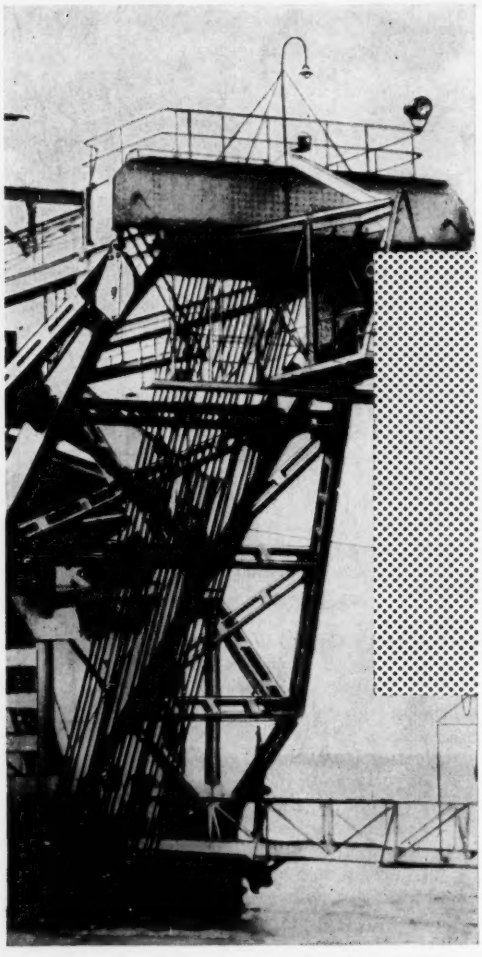
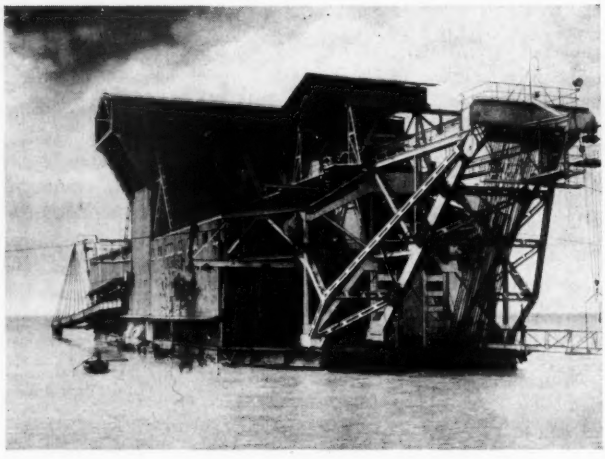


Dredgers for mining alluvial ore-bearing layers or for clearing away sterile top soil, jigs and other washing plant, transporters of all types, materials handling plant - they are all regular items in I.H.C. Holland's building programme.



The success of all mining operations depends - in the long run - on the efficiency of the equipment used. I.H.C. Holland have a research laboratory, the Mineral Technological Institute, where soil-handling problems can be studied for you.

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It follows that the benefits of more intensive training of the African derive at present from the consequent improvement in his working efficiency coupled with the fact that the better trained he is the less he is in need of direct European supervision which in turn results in economies in European personnel. This latter point relates not merely to the direct supervision of working gangs but also to the economies in maintenance staff which follow from a more thorough training of the African in the handling of expensive machinery. This is a matter of growing importance with the prospect, in some mines, of greater mechanization.

Incidentally better African training is not the only factor in this latter respect, and already a number of mines have proved the advantage of planned maintenance schedules for all mining machinery and equipment.

The industry has been giving increasing attention to the organization of training at all levels. African training is going well, particularly among "boss boys" and is paying off not only in higher productivity but also in improved labour relations underground in consequence of the better communication and understanding of instructions.

Within recent months a major reorganization has been undertaken of the Government Miners Training Schools, which up to the present has been the weak link in mining education. They are responsible for the training of White miners in the "days pay" category. Their activities did not keep pace with the other types of training. It is hoped now that using modern methods, including aptitude testing and selective admission, plus training based on the new requirements of the mining industry that a distinct improvement will be achieved before long.

Economies from Concentrating the Mining Area

Economies under this head relate to the labour saving which can be achieved by substituting one long continuous stope for several smaller stopes. This change in mining practice is, however, only practicable where the reef is sufficiently uniform and unbroken by faults or payability to permit of the concentration of several faces into one long one. Mines in this category are unfortunately in a minority, but this method of mining is already being tried out at several mines, notably at President Brand where a face of 3,500 ft. has been established between the 46 level and the 40 level replacing what would probably otherwise have been four separate stopes.

The main advantages of this type of concentration are the following:

1. Improved ground control. The method was first developed to overcome the great hazards of mining at extreme depth and in some mines is essential, regardless of any cost considerations. (e.g. E.R.P.M.). The long wall face system considerably reduces the incidence of pressure bursts.
2. Improved ventilation. Not only is the ventilation of one or two long stopes inherently cheaper than that of a number of individual short stopes, but also far lower working temperatures can be maintained and thus the working efficiency, particularly of the manual workers, is greatly improved. Normally ventilation costs represent anything between 1 and 5 per cent of the mining costs on the South African gold mines. This figure in itself is not a full reflection because of the large amount of ventilation work which by necessity is hidden in other costs. Also it obviously cannot include the enormous labour charge which is simply due to low efficiency working in areas with high humidity.
3. Economies in supervisory personnel. One long face such as that at President Brand would only require *two* or at the very most *three* shift bosses against one per stope for the four small faces.
4. An economy in labour complements. There must always be a certain margin of labour available to avert or overcome the inevitable delays in production which are encountered during a shift, as blasting time tables set an unbreakable deadline for the completion of all shift working and the ultimate inefficiency lies in mining teams failing to complete their task on time. In conventional stopes normally some 120 Africans are employed per stope face (i.e. 480 for four stopes) whereas a maximum of 400 Africans would be required for a long-wall face with a similar production. The saving of European labour would be of the same order.
5. With four small faces there must be four roadways leading either directly to the shaft or to a main haulageway. With one long face, loading and haulage could probably be limited to two, or at the most three, haulageways.

It will be noticed that the above economies are in no sense dependent on capital investment in mechanization nor do they presuppose a more rapid rate of face advance which in itself would be likely to necessitate a greater degree of mechanization. It follows that the introduction of long face working can be considered anywhere where the reef is suitable. A faster rate of advance *may* also be justified, more especially in low grade mines with a long life, but this is a separate consideration unconnected with the economies of long face working.

Economies from Mechanization and Faster Face Advance

For a given daily tonnage hoisted, labour economies can also be effected by concentrating the work in fewer stopes of normal face length and at the same time achieving a sufficiently increased rate of face advance and tonnage output from these fewer stopes to maintain the tonnage hoisted. This indeed is the only scope for labour economy at the face in the majority of mines, which because of faulting or sporadic payability do not lend themselves to long face working. The labour economies from this type of concentration can be more spectacular than from long face working and indeed they appeared to have a certain urgency for all the newer mines a few years ago, when the labour available was often below requirements.

It is, however, necessary to offset against these economies the very considerable costs of mechanization both in increasing the rate of rock breaking and also in getting the rock away from the face. However it has already been shown, on some mines, that the investment in mechanization is well worth while regardless of the availability of African labour. And, of course, if there is to be a drive for gold output to assist the national economy, then mechanization in any case would become imperative.

Waste Sorting

Although waste sorting, in one form or another, has always been a feature of South African gold mining, one potentially very important direction, in which economies in both labour and capital expenditure are currently under examination, concerns the automatic sorting of waste rock from the reef. At present, almost 20 per cent of the ore mined is sorted before the milling stage on 39 of the Witswatersrand mines. Of this figure about 6 per cent is

sorted underground, in the stope, whilst the remainder is removed on surface in picking plants. Various attempts to mechanize this process have not been very successful, though in one or two limited cases it has been found possible to introduce a form of mechanical sorting based on the difference in friability of the rocks. However this certainly has no general application.

With the general rise in labour costs, the cost of hand sorting is obviously increasing but sorting procedures still offer substantial rewards. For example, realizing that reduction costs in South Africa are on average 7s. per ton milled, it can readily be understood that a sorting procedure which would eliminate 25 per cent of the ore mined before milling, could reduce the total working costs by some 3 per cent. (It must be appreciated that the actual cost per ton milled would increase due to the fall in the mill throughput but the grade would be substantially increased.)

The relationship between the distribution of gold and uranium values in South African reefs, particularly those of the Klerksdorp area, is a fortunate and now well known characteristic. Even where the uranium is not itself present in economic quantities it has been found possible to eliminate the non-payable ore by the use of geiger counters or similar electronic devices. Hitherto, these experiments have not been truly successful due mainly to the mechanical aspects of the problem, but recently an automatic sorting device, using a scintillometer and a photo-electric cell, has been introduced at a pilot plant at Hartebeestfontein. The actual sorting is effected using electronically activated air-jets and it appears that the mechanical problems have been solved. The capital installation costs of this type of sorter may be relatively high but the operating costs should be low.

At present, it is only planned to use this type of sorter on surface but quite obviously it could be installed underground and combined with an underground crushing plant. The overall advantage of such an installation would be considerable, for not only would the milling cost be reduced but also the hoisting costs. Additionally the waste or non-payable product from the automatic sorter would be an ideal material for use in pneumatic stowing, which in itself has considerable labour saving possibilities. Recent experiments in pneumatic stowing have been very successful.

The main capital outlay in such a programme would be the excavation of the large crusher chambers but, particularly with a new mine, this would be off-set by the saving of capital in the building of crusher plants on surface and also in the greater hoisting capacity that would otherwise be required. Crushing and sorting underground has the double advantage in that not only is the total tonnage to be hoisted considerably reduced but the actual hoisting efficiency is greatly improved, both by improving the skip-factor and by allowing the introduction of fully automatic hoisting techniques.

We may expect in due course to see a greater use of automatic hoisting arrangements both with the conventional Ward-Leonard hoists and the new Koepe hoists that are being installed at some mines. Automatic hoisting improves the overall schedule quite considerably particularly in the skip loading portion of the cycle.

Automation in the Mill

Automatic control of mill processes both from the point of view of saving man power and reducing recovery losses, is a subject which is at present receiving intensive world wide attention and some further minor economies may in due course be looked for from this direction. It should, however, be remembered that gold recoveries are in any case extremely high in the South African mining industry, while in recent years work study has already made substantial economies in mill complements, which in any case are not a major element in labour costs.

Automation in the Office

The high charge of European labour in the working cost structure is not altogether a function of underground supervision. A proportion is undoubtedly due to administrative work such as time-keeping, etc. The automation of this type of work is by no means new and in many parts of the world electronic computers are already being used for this purpose. Most of the mines, as individual units, are in fact too small to usefully employ a computer but there is no reason why the administrative work of several mines in the same group and in the same area such as the O.F.S. or Klerksdorp, should not join together for administrative purposes and thus form a large enough unit for automation. This could be done in a number of ways, one of which might be the floating off of a separate subsidiary to handle the work. Whichever way the problem is approached, it is certainly a field in which there is considerable scope for saving European labour. The groups are well aware of the possibilities of this type of joint work and it is understood that particular investigations are in hand.

Share Classification by Mine Costs

Enough has been said to indicate the very considerable scope which exists for further reduction in labour costs and also for the stepping up of mine output. Indeed stepping up output is perhaps the more important aspect, as in addition to reducing unit costs by spreading capital charges and overheads more widely, maximizing mine output may well become a top political priority during these next few years. Some of these measures require only small capital expenditure. Others require a lot, but none of them require the extremely large capital sums needed for new shafts or mill extensions (a new shaft these days can cost £2,000,000).

It thus seems not inappropriate to attempt a reclassification of mining shares substituting for consideration of grade in relation to present cost levels consideration of the scope for future cost reductions, or at least the postponement of cost increases in the face of the higher African mine wages which are bound sooner or later to follow those of secondary industry as a result of the drive towards higher African living standards.

Indeed we would suggest to those investors who now discount any imminent gold price increase that today the most important factors in the technical appraisal of share values are the extent to which the reef conditions at some mines offer scope for labour economies by long face working or the remaining life at others is long enough to justify mechanization and a higher rate of face advance.

The possible scope for the economies outlined above is certainly not directly applicable to all mines but they are problems with which the industry is becoming increasingly concerned. There is, of course, a further area for research into the economies which can be derived, not from a change of technique but from improved planning and control of mine operation. For example a number of mines have already successfully introduced standard costing (i.e. responsibility costing) techniques.

Mining Equipment in Yugoslavia

This article presents a precis of the mining equipment currently being manufactured in Yugoslavia, and offers a short list of those manufacturers concerned. The article is condensed from "Commercial News of Yugoslavia", Vol. 7, No. 5

MANUFACTURERS of mining equipment in Yugoslavia are in the main producing equipment according to their own designs, but some units are made on the basis of technical instructions obtained from abroad, and in co-operation with foreign manufacturers. Not only has a large volume of production been achieved, but a wide range of machinery and equipment for different uses in mining has already been reported as mastered and is being manufactured. The Yugoslav machine industry is at present producing about 15,000 tons of machinery and equipment each year, some of which is used in mining, while several thousand tons of machinery and equipment are produced each year exclusively for use in mining.

Scrapers are made in various sizes and types with traction power of 785, 900, 1,400 and 3,500 kgs., and with a range of operational speeds. Bulldozers and angle dozers are produced with driving power of 80 and 145 h.p. on caterpillar tractors. Steam dredges also come under this group, with shovel capacity of 1.5 cu. m., and Diesel-motor dredges as well with shovel capacity of 35, 15 and 1 cu. m.

Lifting devices are manufactured in a wide range covering various types and sizes of electric winches, extraction machinery, single and double decked cages, special cranes, etc. A big range of electric mining winches in a score of different types and sizes with hoisting power from 450 to 5,000 kgs., with one or two drums, with various traction power, speeds and cable lengths. The extraction machinery is produced with traction power of from 1,200 to 1,600 kgs., speeds from 2.6 to 4 m. per sec., and cable lengths of 120 to 350 m. Complete cable movers of various types and sizes are manufactured under this group for various purposes.

Coal and ore refining equipment constitutes the largest group of machines and equipment, including hammer crushers, single and double sieves, vibrators, washing equipment, ore flotation equipment and other mining installations.

The hammer crushers are made for 8 to 25 tons an hr. and have different sized feed openings.

Simple rock sieves have a capacity of 75 tons an hr., a maximum of five gradings, and motor power of 10 kW., while double rocking sieves made for the same capacity, have a maximum of four gradings and motor power of 15 to 18 kW. Sieves with an eccentric, double sieves with eccentric, and sieves with eccentric on top are also made to the same capacity, in addition to sieves with eccentric with springs of a capacity of 25 tons an hour, and various other sieves with capacities from 100 to 400 tons an hr. This group also covers the production of vibrators of up to 70 tons capacity an hr., with various size sieves from 1,000 × 2,500 mm. to 1,600 × 3,600 mm.

Washing installations are produced with capacities up to 100 tons an hr. and three gradings at the most, with separations made according to customers' plans. Ore flotation equipment is made.

For railway traction, machine manufacturers produce steam and Diesel locomotives for both standard and narrow (.76 m.) gauge railways. The steam locomotives are built with steam operation pressure of 12, 14 and 16 kgs./sq. cm., while the Diesel locomotives have a power of 20, 50 and 100 h.p. Diesel factory or freight-yd. locomotives have a power of 400 h.p.

For conveying the manufacturers of mining equipment produce dump cars of .75 and 1.65 cu.m. capacity. Both cars are made with or without brakes. In addition to these, dump cars are made for the disposal of rock, their capacities 3.5 cu. m., while underground transporters of 600, 1,000 and 1,300 litres are also produced. For transport of coal and various kinds of ore, Yugoslav manufacturers of railway vehicles produce various kinds of special cars suitable for quick loading and discharge.

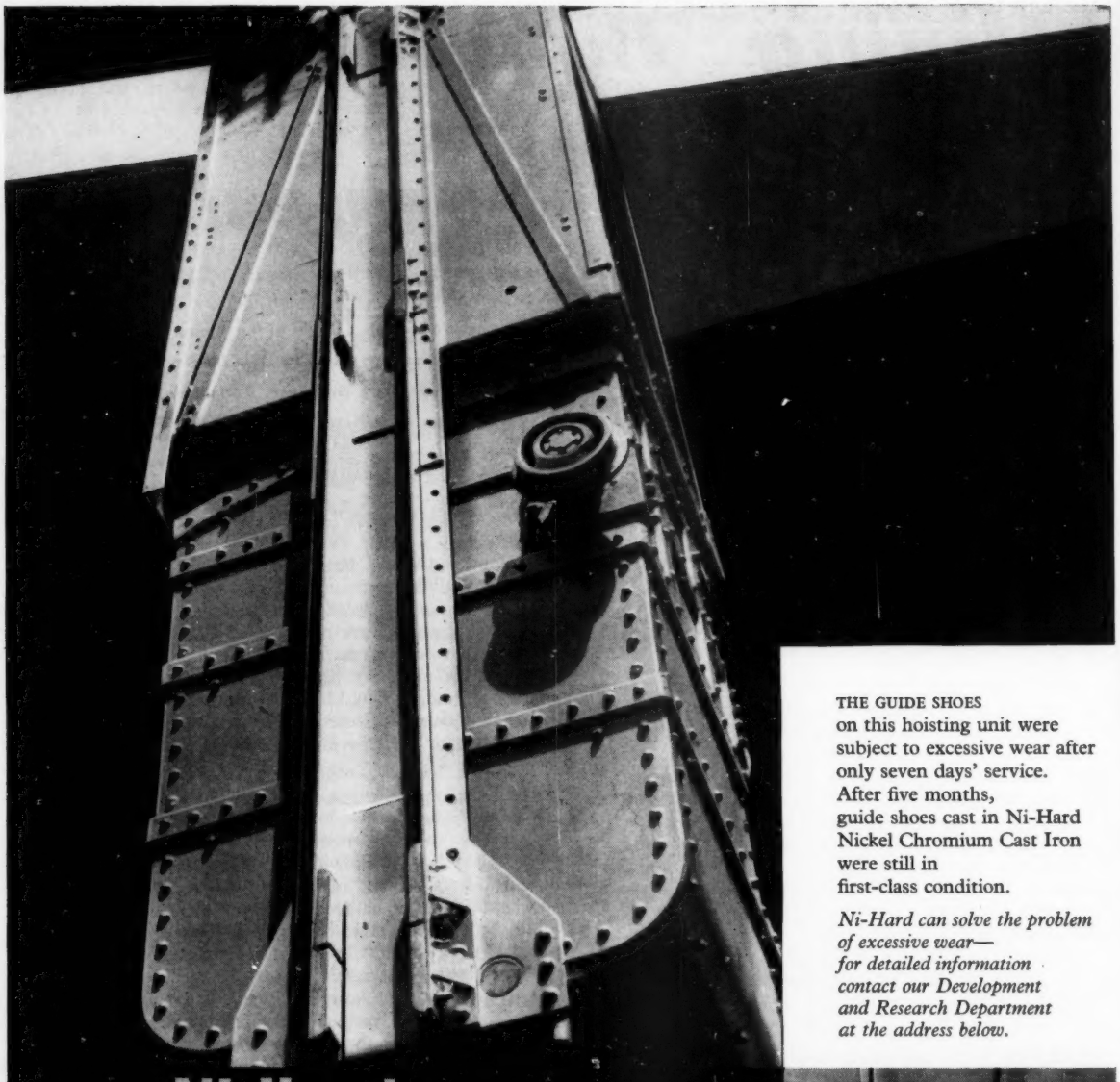
In the field of transportation Yugoslav machine factories produce a broad range of various types and sizes of rubber conveyor belts 500, 650, 800 and 1,000 mm. in width, then portable rubber conveyor belts of various capacity and belt length, special belts of 600 and 100 mm. width and capacity of 110 to 250 tons an hr. This group also includes chain conveyors with single chain capacity of 90 to 120 tons an hr., conveyors with two chains, steel band conveyors, mechanical loaders, etc.

The Yugoslav machine industry produces also a whole series of miscellaneous machinery and equipment such as compressors of various sizes, pneumatic drills and other pneumatic tools, then various kinds of pumps, ventilators and exhaust fans of various types and sizes, steel pit props, mining lamps and equipment, etc. Pneumatic drills are of light construction and weigh 18 and 22 kgs.

Drilling units for exploration drilling are made with manual, mechanical and hydraulic drive, and allowing for from 90 to 600 revolutions per min. and spindle pitch of 400 to 600 mm. Derricks of steel tubing, with capacities of 5, 10 and 15 tons, 5.5 to 14.5 m. in height are also produced for exploratory drillings. All auxiliary equipment and tools which go with this kind of equipment are manufactured according to recognized standards.

Besides meeting the growing requirement of the domestic market, the production of machinery and equipment for mining and building construction has likewise found sale on many European, African, Asian and South American markets.

The principal manufacturers of machinery and equipment for mining and building construction within the Yugoslav machine industry are: Strojna Tovarna, of Trbovlje, Duro Dakovic of Slavonski Brod, Ivo Lola Ribar of Zeleznik, Fabrika Gradevinskih Masina of Smederevo, Jastrebac of Nis. 14 Oktobar of Krusevac, Metalna of Maribor, Jelsingrad of Banja Luka, Trudbenik of Doboj, and Mackatica of Surdelica.



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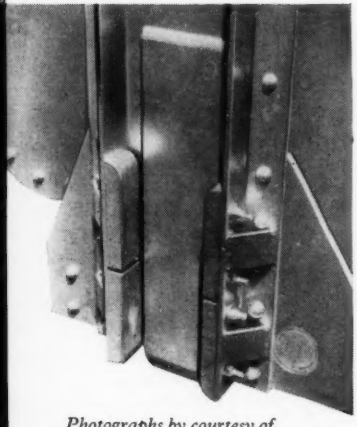

Photographs by courtesy of Wabi Iron Works Ltd, Ontario show how guide shoes were fitted.

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TGA C1371/1

Technical Briefs

Treating Copper Ores in the United States

The first commercial plant in the United States to use the segregation process on copper silicates was recently put into operation at Transarizona Resources' Mine, south of Casa Grande, Arizona. The rotary calciner is the heart of the process and here the temperature is held at 1,400 deg. F, being heated by natural gas burners so that the salt and coke convert the copper mineral to firmly divided metallic copper which can be separated by flotation.

A review of the latest development in the leach-precipitation — flotation process for dealing with mixed sulphide—oxide copper ores at Miami has recently appeared. The process, contrary to common belief, was used as early as 1934 but the plant was shut down in 1943 with the exhaustion of the mixed orebody. (L.P.F. at Miami, Analysis of Latest Operations, by J. J. Bean, mining engineer.)

It was re-introduced in 1957 and precipitation is achieved by scrap iron rather than by the use of iron powder. This is done in revolving drums containing coarsely shredded iron, usually, burnt tin cans. The drums which are equipped with lefters and the bulk of the cement copper is discharged as a powder so that it is readily recovered by flotation. Some copper remains in the drum, however, as there is a tendency to build up accretions and after a period it is necessary to empty the drum, remove the iron with a magnetic pulley, thus recovering this coarse copper.

After leaving the drum any coarse iron is removed by a fixed screen and the fine material by wet magnetic separation before recovering the copper by normal flotation. Copper precipitation has been found to be improved by returning the fine iron from the magnetic separator to the last agitator prior to the precipitation drum. Whilst it is desirable to add milk of lime to raise the pH to about 3.0 before precipitation.

SLIME COATINGS IN GALENA FLOTATION

Although slime coating has long been known to have a pronounced detrimental effect on flotation, it has been the subject of few investigations. It has been postulated that probably the electrical double layer on the particles concerned is responsible and work by previous investigators has shown that there is a connection between the sign of the zeta-potential and the development of such a coating, negatively charged particles being attracted to a positively charged surface.

Investigations using galena, which is normally negative at a pH between 3 and 11, and slimes prepared from minerals such as iron oxide, aluminium oxide and fluorite, which are positive at certain pH ranges, indicate that coating is heavy and flotation of the galena is depressed. On the other hand, less effect is to be observed with slime which is normally negatively charged. Thus, the flotation of galena is not effected by kaolinite, gypsum or manganese-dioxide.

If the conditions are changed, so that the charge on the slimes causing depression is altered to a negative value, the depressing effect can be eliminated.

On the other hand, light slime coating can take place under conditions where the thickness of the electrical double-layer is sufficiently small to allow the van der Waals' attractive forces to predominate. In this case, light slime coating occurs when both surfaces carry a charge of the same sign, but the coating is not detrimental to the efficiency of flotation.

TREATING TIN ORES BY T.B.E.

There is a difference in the density of lode material and country rock, even when only low grade ores are being treated, due to the high proportion of other minerals associated with the cassiterite such as tourmaline, iron oxides, sulphides, etc. With such a medium as T.B.E. available, the specific gravity of which can be adjusted accurately by diluents to any required figure, separations of waste of a desired tailing value can be made.

At one mine it has been demonstrated that some 98.2 per cent of the tin can be recovered in a product representing 44.4 per cent by weight of feed material. In this case the feed material consisted of a washed $+\frac{1}{2}$ in. jaw crusher product from a granitic type ore. It is claimed that not only could this result in economies in later crushing and grinding but, as the removal of certain mineral associated with the country rock occurred and, a higher ratio of cassiterite to other heavy minerals resulted, a more attractive feed to the subsequent gravity concentration plant becomes possible with a possible reduction in the quantities of middling products circulating.

Whilst this coarse sorting of ores is practicable for true lode formations it may be necessary when working stringers or composite lodes to crush the ore to something of the order of $\frac{1}{4}$ in. - $\frac{1}{2}$ in. before sufficient liberation is effected. On material of this type results have again been highly encouraging with a recovery of tin well in excess of 90 per cent in a concentrate of between a quarter and a half the weight of the feed.

The treatment of the concentrates from large jigging installations, or the treatment of sluice or Willoughby Jig concentrates now also becomes practical and tests on beach sands containing very fine grained cassiterite demonstrate the recovery of, in one case 78 and in another 87 per cent of the chemical Sn content in a concentrate only 20 per cent by weight of the feed material. Higher or lower recoveries of cassiterite can be effected by adjusting the liquid density though this naturally affects the grade of the concentrate.

Apart from its use as a means of sorting coarse ores, the T.B.E. process can have applications in mills concerned with the recovery of the cassiterite after grinding. Sand tailings from a number of mines have been examined and it was usually possible to recover over 80 per cet of the cassiterite values in a rough concentrate only a quarter and a third the weight of the feed material. Enrichment ratios of between 2 and 4 seem to be usual for this type of tailing separation.

Higher recoveries are said to be practical on classified material at present being fed directly to wet concentrating tables. Tailings values are reduced and it always appeared possible to reduce the amount of middling requiring regrinding. Primary table concentrates were treated in T.B.E. to prevent successive tabling stages and, in these cases, virtually 100 per cent of the tin was recovered

The reduction of middling products is important in order to reduce costly grinding and the possible loss of the cassiterite due to sliming, and the T.B.E. process appears to be satisfactory for this purpose as it will eliminate the lighter waste minerals from the true middling.

A process to treat the finer size ranges is not fully developed but at present it has been developed to the point where, it is claimed, appreciable enrichment of tin ores and tailings can be achieved commercially.

VIBURNUM PROJECT STARTS PRODUCTION

The highlights in the St. Joseph Lead Co.'s new Viburnum plant in Missouri are the material handling facilties contained and the extensive use of automatic controls. The flowsheet is essentially one involving conventional crushing, with rod mill and a ball mill operating in closed circuit with cyclones followed by flotation.

Push buttons in the control room enable any blend of ore to be made from the fine ore bins; and in the crushing section, an intercom system is used to tell the operator the source of the ore being crushed. A rod charging device, similar to that used at other St. Joseph plants, is installed and balls are transported in a special hopper to the feed end of the ball mill, where the relaxation of tension in the hoist rope allows a trap door in the hopper bottom to open and discharge the balls.

The feed to the rod mill is automatically adjusted by devices which measure the circulating load on the cyclone underflow and the pulp density, the feed rate being integrated with the amount of water added. In addition, the intake of the pump feeding the cyclones is fitted with a pulp level indicator to ensure that the feed is constant. This indicator controls the amount of cyclones overflow which is recirculated.

The circulating load in the circuit is measured by means of a hinged weighing box of measured volume through which the cyclone underflow passes. In addition, a gamma-ray pulp-density unit monitors the overflow continuously and is connected to a water supply control valve.

After flotation, the concentrate is thickened in the normal manner but the underflow passes through a cone *en route* to the filters and a float control operating a pinch valve, maintains the correct level of concentrate slurry in the filters, any overflow from the cone returning to the concentrate thickener.

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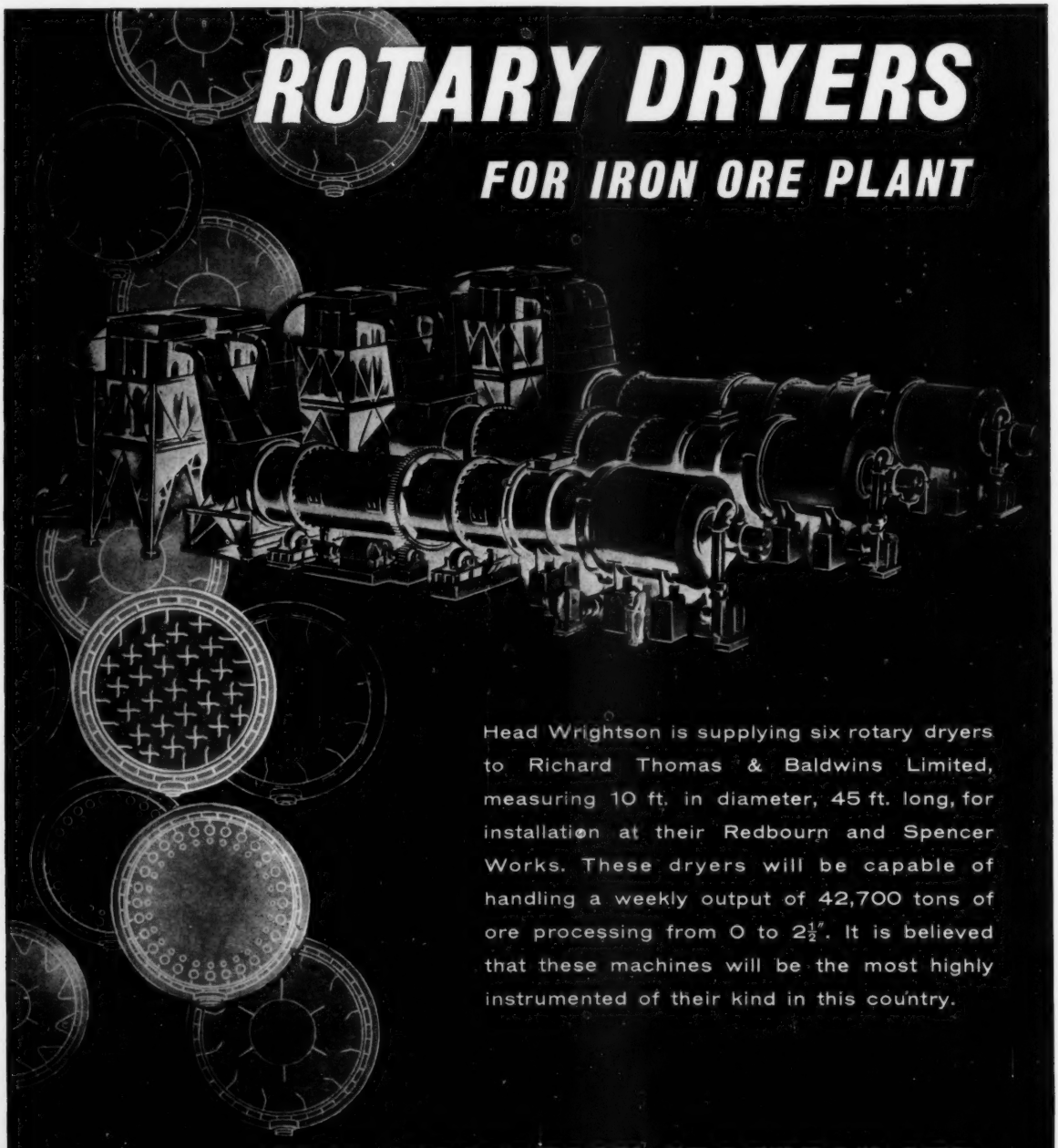
FOR IRON ORE PLANT



Head Wrightson is supplying six rotary dryers to Richard Thomas & Baldwins Limited, measuring 10 ft. in diameter, 45 ft. long, for installation at their Redbourn and Spencer Works. These dryers will be capable of handling a weekly output of 42,700 tons of ore processing from 0 to 2½". It is believed that these machines will be the most highly instrumented of their kind in this country.

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P 5501

MINING MISCELLANY

American copper companies in Chile are to expand their capacity by about 50 per cent, and there is to be a similar increase in the capacity of the Chilean owned copper and iron mines. The value of the equipment to be imported for the execution of this programme is estimated at $364,000,000.

*

Mr. K. D. Malaviya, Indian Minister for Mines and Fuel, said at Nagpur recently that the State-owned National Mineral Development Corporation had decided to undertake mining of iron ore at Radi on the seashores in Ratnagiri district in Maharashtra State. The State Government, he said, was likely to become a partner of the Corporation for this project.

*

Six Japanese experts have completed a survey of iron deposits in the Tijilatjap area in Java. The survey was conducted to explore the possibility of constructing a steel factory in Java. Results are said to be encouraging.

*

A rich deposit of copper and platinum has recently been discovered in Calca province, Cuzco Department, Peru. The platinum is said to be in the proportion of 11.6 grammes per ton while the copper is said to have a fineness of 24.8 per cent to 70.7 per cent. Extensive deposits of silver, copper, lead, coal and other related minerals are reported to have been discovered in January in Chachapoyas Province.

*

Bayswater Hydro-Industries Pty. Ltd., have introduced the technique to their lease on the Maitland Coalfield of New South Wales. *The Journal of the Australian Coal Association* says it is the first time that hydraulic mining has been used underground in Australia. A dam holding 1,500,000 gallons of water supplies the powerful jet for the mining operation. The water reduces two of the major hazards of mining—coal dust and the formation of gas.

*

Work on the Hindustan Aluminium Corp.'s 20,000 ton project in Uttar Pradesh State is progressing rapidly, according to latest reports. Current estimates are that the plant may go into production in the early part of next year. The reduction plant is likely to be ready next January, it is understood, and it is planned to put it into operation initially with imported alumina, after which the plant will derive its raw material from locally occuring bauxite. Of the initial output of 20,000 tons of ingot, about 15,000 tons will be taken by on-site fabricating facilities where it will be manufactured into conductors, re-draw rods and extrusions and sheets. Later it is hoped to expand the plant's ingot capacity to some 50,000 tons a year.

*

A company has been formed in Sydney to mine cobalt in North Queensland. The company is Australian Cobalt Developments Ltd. with a capital of £A100,000. The mine, known as Mount Cobalt, is in the Cloncurry field and was worked between 1921 and 1934, workings reaching a depth of 212 ft. on a shoot reported to be 720 ft. long. Water supply was then inadequate to cover long periods of drought. Treatment was by gravity concentration. The company will use a chemical and electrolytic process to produce metallic cobalt or other cobalt compounds. Previous work produced 15,000 tons of tailings assaying 2.23 per cent cobalt, which will be treated, and the company intends to buy cobalt ore from owners of adjacent cobalt orebodies.

*

In view of the growing shortage of economically exploitable copper ore in Sweden, the Boliden Mining Co. is investigating the possibility of mining certain low grade ores in the Liikavaara district of North East Sweden.

*

A claim is before the Queensland Industrial Court for an increase of £A4,000,000 per year in the Mount Isa Mines Ltd. production bonus, a 30 hour week in some sections of the work and an increase of 41.6 per cent on the 1959 margins. The present bonus, fixed by the Court a year ago, is £8 per week, and a 40 hour week is worked. The claim by the Australian Workers Union is for a bonus of £25 per week, to their members; the claim for members of other unions is for £29 12s. per week. Mount Isa Mines is the State's biggest single enterprise, Australia's largest underground mining enterprise and Australia's largest earner of export income; last year the company paid out an estimated £750,000 extra to employees under Court awards made in December, 1959. The Australian Workers' Union is seeking a general increase of 41.6 per cent in all margins in all Queensland metal mining awards.

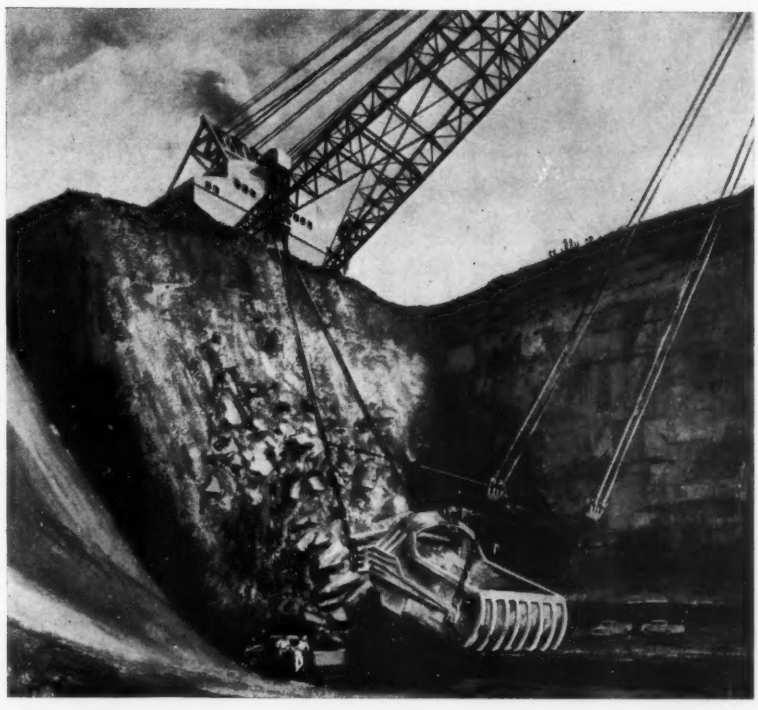
*

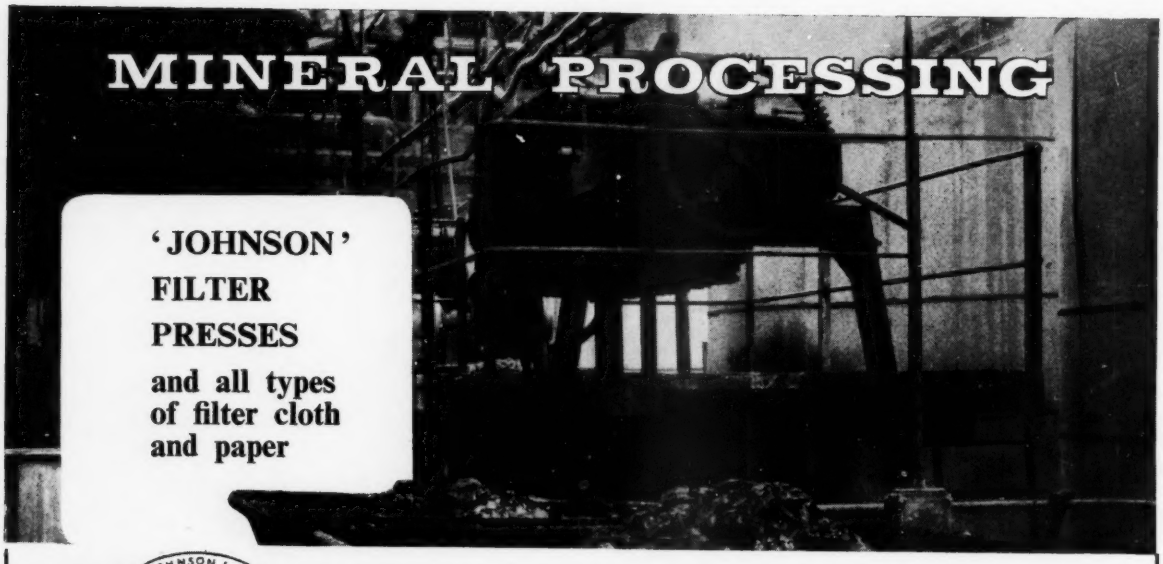
Cerro Corporation is negotiating for loans for the development and bringing into production of the company's Rio Blanco copper property in Chile. The decision to go ahead with financing arrangements followed an agreement reached in principle last year with the Chilean Government on taxation, repatriation of investment and other matters relating to the Rio Blanco mining project. It will take approximately five years to construct the required Rio Blanco production facilities for the planned initial annual output of about 65,000 tons of copper.

*

In a move which could markedly increase United States minerals production, Mr. S. Udall, U.S. Secretary of the Interior, has proposed that seven new minerals including gold, silver and iron ore be added to the list of commodities for which the Federal Government would provide exploration assistance. In addition, he said, the government would pay up to 75 per cent of

A walking dragline claimed as being over twice the size of any previously built anywhere is a Marion Type 8800, purchased by Peabody Coal Co. U.S. This artist's impression shows that with a 275 ft. boom and 85 cu. yd. bucket, the machine will have a working weight of over 5,100 tons. By comparison, the Marion 7800, claimed today's largest dragline, carries a 220 ft. boom, a 35 yd. bucket and has a working weight of 1,725 tons. From an operating standpoint the 8800 can dig material 12 stories below ground level, swing it over 550 ft. and dump it on top of a 14 story building





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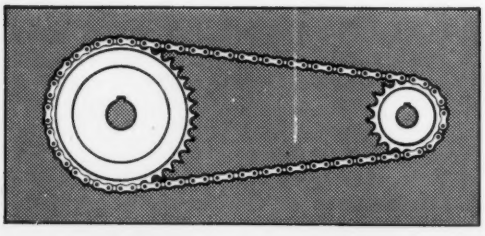

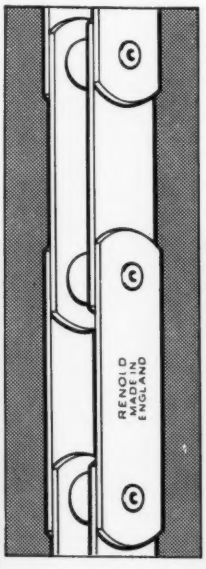

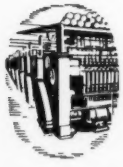

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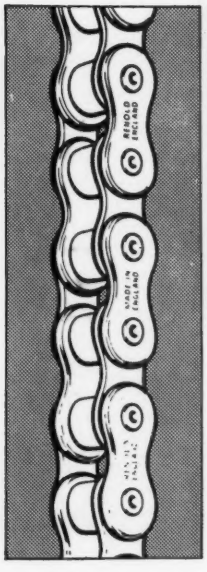

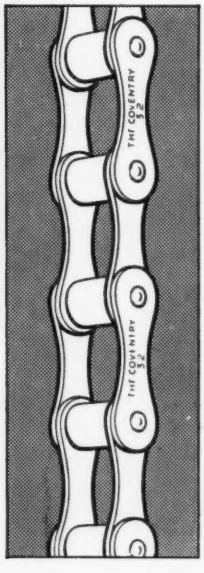

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authorized exploration costs for 18 critical mineral commodities, including asbestos, beryllium, chromite and mica. The government would contribute 50 per cent of the exploration costs of bismuth, sulphur, and tellurium and 75 per cent of the exploration costs of bauxite, columbium, corundum, industrial diamonds, graphite in cruxible flats, strategic kyanite, manganese, mercury, nickel, platinum group metals, quartz crystals, talc, tantalum and tin.

★

The Belgian firm, SA Laminoirs de l'Escaut, at present operating a foundry with a monthly capacity for 800 tons, will set up a further foundry bringing its monthly capacity to 2,800 tons. The expansion of its rolling mill plants has brought the company's rolled aluminium capacity to 1,000 tons monthly with a further expansion of 3,000 tons now under way.

★

A special aluminium alloy has been produced in Stockholm which is reported as more suitable for automatic lathe working than pure aluminium and other similar alloys. The new metal, which is called SM 6249, is an alloy of aluminium, copper, magnesium and lead and can be hardened.

★

Aluminium-Industrie-Aktiengesellschaft of Chippis, Switzerland announced in its report for 1960 that it will start soon the construction of a new aluminium smelter at Steg. Simultaneously, work on the installation of a modern strip rolling mill and on the expansion of the pressings plant will begin at Chippis.

★

A French company for the development of aluminium production in Greece, Societe Francaise pour le Developpement de l'Aluminium en Grece, has been formed in Paris by the Pechiney group. This follows the allocation of a contract to the group for the erection of an aluminium industry in Greece.

★

Turkish copper exports through the Etibank have risen. Steps have, therefore, been taken to increase the copper ore output. Last year's output amounted to over 26,200 tons compared with 25,000 tons in 1959. This year's output is expected to reach 26,500 tons.

★

In its preliminary report on the exploitation of ferro-manganese mines in Greece, the Industrial Development Corporation estimated the needs of the projected iron and steel industry at 3,400 tons of ferro-manganese and 1,200 tons of pyrite-manganese per year. The report estimated the cost at $1,300,000, and proposed electrical smelting process for production. Among other new mining industries under consideration by the IDC are the establishment of a zinc industry with an annual production of 15,000 tons of zinc and 15,000 tons of lead at a cost of $11,000,000. A report is also being drawn up to assess copper deposits in Chalcidice, Northern Greece. A sum of 600,000 drachmas has been allocated to the preliminary survey.

★

According to the Spanish Foreign Exchange Control Board, Spain last year exported the following minerals: pyrites worth $15,700,000, iron ore worth $13,900,000, mercury ($9,500,000), unmanufactured copper, bronze and tin ($7,600,000) and lead ($7,500,000).

★

The Orinoco Mining Co., Venezuela, will this year reduce its iron ore output by over 4,000,000 tons, or 25 per cent, owing to the considerable drop in demand for steel, especially in the U.S.A. and Europe.

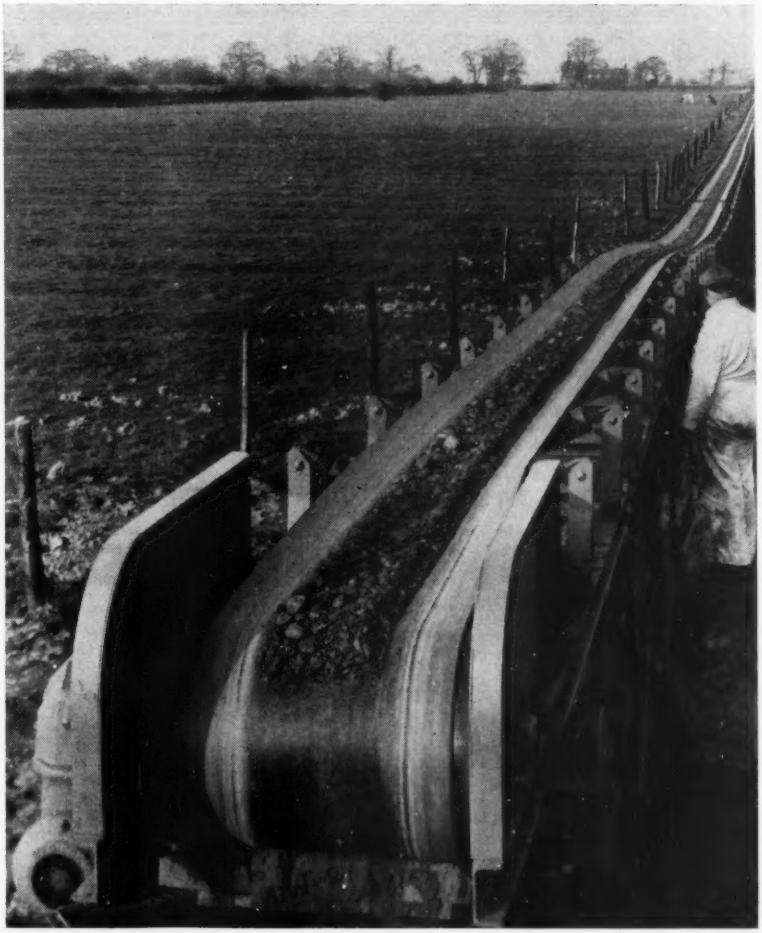
★

Three U.S. Senators have urged President Kennedy to reinstate for a two-year period the domestic manganese carlot purchase programme which the government terminated August 5, 1959. They urged issuance of an executive order reinstating the carlot programme, which was limited to ores containing at least 40 per cent manganese and which placed a 10,000 ton annual limitation on each shipper. The Senators suggested that "such reinstated programme shall run for a period of two years and shall be limited in quantity to 10,000,000 s.ton units and in participation to those corporations, partnerships and individuals that were participating in the programme which terminated on August 5, 1959". Feasibility of selling up to $5 billion worth of strategic and critical minerals and materials now held in government stockpiles will be studied by the Congressional Joint Committee on Defense Production.

★

The Standard Beryllium Corporation of New York has bought from Icombra a 1,700 acre beryllium concession in the State of Minas Gerais, Brazil. The American company intends to extract beryl and other minerals by the installation of plant capable of processing about 100,000 tons of crude ore a year.

One of the longest above-ground conveyor belts in the country—over 2,000 ft. long—relies on 'Terylene' for its strength. The belt is 24 in. wide, and carries up to 200 tons of sand and gravel an hour at the Midland Gravel Co. quarry, Sutton Coldfield. Made by Barrow, Hepburn and Gale Ltd., from a 4 ply 'Terylene'-cotton fabric, the rubber covered belt is stated to be not only stronger than the cotton belts previously in use but also cheaper. When Midland Gravel changed to a 'Terylene'-cotton fabric, the whole conveyor was redesigned by Mining Engineering Co. Ltd. to take full advantage of the strength and flexibility of the new style belt. Previously three belts and two transfer points were necessary. These have now been replaced by one belt. Now one man is stationed at each end of the belt and keeps in touch by field telephone



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Metals and Minerals

Hard Times For Indian Manganese

The Madhya Pradesh government has turned down the application of the British-owned Central Provinces Manganese Ore Company for renewal of mining leases, according to a report from Calcutta. The company, it seems, has lodged an appeal to the Central government and has been granted a temporary extension of two months while the government examines the case.

The company has, in all, 19 leases, which were granted from 1901 onwards and again renewed in 1931 for 30 years. Of these, 8 are in Madhya Pradesh and 11 in Maharashtra. Eight leases expired in March and another eight are due to expire in May, and the remaining 3 from 1968 onwards.

The State government is quoted as saying that it was "wholly unable to grant further leases contrary to the Industrial Policy Resolution". Furthermore, the Mining Act prevented renewal of leases except where a special case was made out.

The board of Central Provinces Manganese in London, commenting on this development, points out that leases of some of the company's mines were due for renewal on April 1. The leases of all the mines contain a right of renewal which has been applied for but has not yet been granted. Negotiations with the Indian government are in progress.

The Indian manganese ore industry as a whole is still in the throes of depression, due to the combined effect of saturated demand and keen competition from new sources of supply. The prolonged absence of enquiries from abroad has led to the closure of about 50 per cent of the mines in the ore producing areas, a rather unusual development at this time of the year. Many ore shippers are understood to have switched over to other lines of business. India's exports of manganese ore in the first quarter of this year total 142,500 tonnes compared with 173,000 l.tons in the corresponding period last year. It may be mentioned that a few years ago, manganese ore was one of the major dollar earners of the country.

Exporters of ore are asking for positive steps to be taken to increase exports, and one measure suggested is permission to enter into barter deals with foreign buyers. It has been pointed out that steps should also be taken to bring down prices of Indian ore to make it competitive in world markets. A reduction in the f.o.b. prices, it is emphasized, will be possible only if the railway freights are drastically cut.

The prevailing freight structure was designed in 1958 on the basis of the Mudaliar Committee's recommendations, which were made at a time when the ore market was in better shape. The quasi-monopolistic role of the State Trading Corporation in the manganese ore export trade is another reason for the present depression. Ostensibly brought into supplement normal trade channels, it has gradually come to supplant them.

JAPANESE STEEL COMPANY PLANS ALUMINIUM VENTURE

The Yawata Iron and Steel Co., the largest steel producer in Japan, is planning to start aluminium production jointly with other Japanese firms employing a new technique for extracting aluminium as well as iron from laterite.

In the course of an extensive search for overseas ferrous resources for its expansion programme, the company discovered that laterite, which is abundant in the Philippines and other South East Asian countries, could be used as a new material for steel production. Laterite also contains aluminium, which could be extracted for aluminium production by a new method developed by the company after the ferrous content had been removed.

Other partners in Yawata's venture are the Nisso Steel Manufacturing Co., which had experience in producing aluminium during the second world war, and the Konoshita Sansho Trading Co. It is understood that the group plans to introduce the aluminium refining techniques used by the Kaiser Aluminum and Chemical Corporation of the U.S.

Another Japanese industrial group, led by Mitsubishi Chemical Industries Ltd., is also preparing to enter the field of aluminium, which at present is dominated by the Japan Light Metal Co. and two other firms.

*

M. A. Dumas, general manager of Aluminium Francais, told a meeting organized by the Franco-Belgian Chamber of Commerce recently that aluminium prospects were "brilliant". Thanks to the technical progress the metal's position had steadily improved in the past. The new production processes, now under study, might considerably reduce production costs of aluminium and thus bring about a new stimulus for it.

M. Dumas also supplied figures about the development of production and consumption in the Common Market: France's capacity was 265,000 tonnes per annum at the beginning of 1961 against 100,000 ten years ago. At the end of this year it would reach 340,000 tonnes including a share in Cameroun output and shortly it should reach 400,000 tonnes.

In West Germany the production capacity had risen from 80,000 to 180,000 tonnes in the past ten years and in a few years it would total 250,000 tonnes. Italy's capacity of 90,000 tonnes would be brought up to 140,000 tonnes when the new plant in Sardinia commenced operation. Belgium had a 5,000 tons share in the Cameroun output.

The capacity of the six would reach 615,000 tonnes at the end of 1961, said M. Dumas, to which should be added the various projects such as the 54,000 tonnes Surinam plant in Dutch Guiana, a plant planned in Holland, and a 52,000 tonnes plant in Greece, the most recent common market participant. Within the next five years the Community's total capacity could thus be near to 1,000,000 tonnes.

M. Dumas said that the Common Market would be able to absorb this surplus because consumption was increasing. Consumption per head in the U.S. amounted to ten kilos per year, while consumption in the community was only four kilos per head and there was consequently a very big potential demand. He estimated that consumption, which rose from 157,000 to about 700,000 tons in the past ten years would attain 1,400,000 tons in 1970.

TENDERS SOUGHT FOR JORDAN PHOSPHATE PLANT

A spokesman of the Arab Potash Co. has announced that the company will invite international tenders for the construction of a large potash plant following the completion of tests by a pilot factory next September. He said that the projected plant would be able to compete with Israel and export annually 250,000 tons of Jordan potash by 1964, and added that the company's capital would have to be increased from £4,000,000 to £6,000,000.

India is to increase her imports of Jordan phosphate according to an agreement reached between both governments at the end of 1960.

JAPANESE FERRO-ALLOY DEMAND FORECAST

The Japanese ferro-alloy industry has estimated that 484,100 tons of ferro-alloy products or about 70,000 tons more than in the last financial year ended March 31, 1961, would be necessary to meet both domestic and export requirements for this financial year just started, according to the Japan Ferro-Alloy Makers' Association.

The Association said the total amount required for the financial year April, 1961, to March, 1962, included 30,000 tons of high-carbon ferro-chrome, against 25,000 tons, and 66,000 tons of low-carbon ferro-chrome against 58,000 tons.

Out of the estimated ferro-chrome production, 3,000 tons of high-carbon and 20,000 tons of low-carbon ferro-chrome were expected to meet export demands during the year, the Association added.

Estimated demand, again for both domestic and export requirements, for low and medium-carbon ferro-manganese is put at 50,000 tons for the coming year against 38,000 tons. Demand for silicon manganese is estimated at 77,000 tons against 62,000 tons, and for ferro-silicon at 95,000 tons against 80,000 tons.

FINNISH CHROME ORE MINING TRIAL

Mining on a trial basis has been started at the chrome ore deposit discovered nearly a year ago at the lower part of the Kemi river valley. Some 5,000 tons of ore are to be mined which will be delivered to the Finnish metal firm A/B Outokumpu OY for enrichment. It will depend on the result of this enrichment process whether exploitation is started on an industrial scale.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

With all reports from the U.S. becoming more optimistic, the price structure of the four metals has remained steady with, in most cases, a small gain in the actual price. It must be remembered, however, that there is still an overproduction in copper, lead and zinc and that consumption has got to increase to a very much greater extent than is now the case before any sustained price rise can be expected.

U.S. COPPER SCRAP PRICE RISES

The only significant price alteration in the copper market has been the raising of the U.S. customs smelters intake price for scrap on two occasions in the last seven days, bringing the price to 25¼ c. per lb. as against the 24½ c. per lb. ruling a week ago. The scarcity of scrap in the U.S. is now attracting a great deal of attention, and there are some suggestions that export licensing may be re-established. This is probably wishful thinking, however, on the part of those who find they are unable to compete with the price being paid by the Japanese. It now appears that the Japanese buying will continue for some time, as a further substantial allocation of dollars has been granted for the purchase of refined copper and scrap until the end of 1961.

As an indication of the improved trade in the U.S., the figures for copper fabricators for March show that products containing 115,163 s.tons of copper were delivered to users as compared with a figure of 96,386 s.tons for February. The tonnage shipped is the highest since September, 1959. New orders also increased to 114,416. s.tons of copper content as compared with 102,905 s.tons in February. Unfulfilled orders remained approximately the same, but stocks held fell 3,239 s.tons to a total of 448,456 s.tons.

In Europe, demand has remained unspectacular but continues at a steady rate and any signs of a fall in the price brings in buyers. On the Metal Exchange, markets have remained steady with a fair amount of activity, the stocks in official warehouses falling 25 tons to a total of 14,942 tons.

On Wednesday there were indications that labour trouble might develop at the Mufulira mine later in the week.

I.T.C. FIGURES UNDERLINED SHORTFALL IN OUTPUT

The tin market has also remained active but has moved within narrow limits with the London and Singapore markets moving independently. It is believed that the buffer stock manager has sold a further small tonnage of metal during the week. Stocks in official warehouses fell 66 tons to a total of 10,117 tons. Various figures issued by the International Tin Council appear to underline the shortfall in production, which is the reason behind the recent sharp rise in the price. Although some of the figures are a little bit out of date the most interesting are:

Smelter production of tin metal in Malaya and Singapore fell to 4,870 tons in February as compared with 7,227 tons in January.

Exports of tin in concentrates from Bolivia fell to 1,176 tons in January as compared with 2,214 tons in December.

Exports from Nigeria fell from 1,028 tons in November to 473 tons in December.

As against these figures, exports of tin metal from Malaya and Singapore recovered to 7,027 tons in March as compared with 5,028 tons in February and 6,300 tons in January. Production of tin concentrates in Malaya in March contained 4,512 tons of metal as compared with the January figure of 4,065 tons.

On the consumption side, the U.K. figure for January rose above December but showed a small decline in February, whilst in the U.S. the downward trend was reversed in January, when consumption showed an appreciable rise at 3,680 tons as compared with 2,845 tons in December.

On Thursday the Eastern price was equivalent to £858⅜ per ton c.i.f. Europe.

LEAD-ZINC STOCKS LOWER

The lead and zinc markets have continued without any points of note although many dealers profess not to understand the strength in lead, whereas the zinc picture is strengthened by further cutbacks in the U.S. by the New Jersey Zinc Co., estimated to total 1,500 tons a month. Stocks in official warehouses of both metals fell, lead stocks falling by 3 tons to a total of 11,929 tons and zinc stocks by 231 tons to a total of 4,845 tons. The O.E.E.C. statistics for March show a production of lead of 68,095 tonnes, as compared with 61,460 tonnes in February, and stocks at the end of March rose to 52,830 tonnes as compared with 49,383 tonnes at the end of February.

Production of refined zinc totalled 81,748 tonnes in March as compared with 73,082 tonnes in February, and stocks of refined zinc at the end of March totalled 44,938 tonnes as compared with 45,988 tonnes at the end of February.

OFFICIAL TURNOVERS

Official turnovers (in l.tons) for the week ending April 21, with the previous week's figures in parentheses, are:

Copper	14,300	(18,225)
Tin	1,320	(2,125)
Lead	8,525	(7,750)
Zinc	6,225	(6,400)

Closing prices are as follows:

	April 20		April 27	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£228½	£228¾	£232¼	£232½
Three months ..	£229¾	£230	£234	£234¼
Settlement ..	£228½		£232½	
LEAD				
Current ½ month	£67½	£67¾	£67⅞	£68
Three months ..	£68⅛	£68¼	£69	£69⅛
TIN				
Cash	£842	£843	£840	£842
Three months ..	£850½	£851	£848	£849
Settlement ..	£843		£842	
ZINC				
Current ½ month	£83½	£83⅝	£83½	£84
Three months ..	£83⅝	£83¾	£83¼	£83⅞

London Metal and Ore prices appear on page 496.

Mining Finance

General Mining to Pros the C

General Mining and Finance, the large South African mining house, has reached an agreement with the Katanga government for the sole prospecting rights on an area of some 7,500 square miles in the Congo pedicle. This news from South Africa is remarkable both in the mining and the political sense.

With the controls at present in force on the export of capital from the Union, an agreement such as this must presumably have had the support of the government and it is certainly most encouraging that Dr. Verwoerd has sufficient faith in the political stability of Katanga to consider this a reasonable investment at a time when South Africa itself is short of capital. If nothing else this must imply a certain mutual respect between the two countries which in itself is a wholly satisfactory position for the future of the sub-continent.

On behalf of General Mining, Col. Jack Scott has been the negotiator with President Tshombe and it has been agreed that a new company will be formed in Katanga in order to prospect the area and that this company will have sole rights for a period of five years. The area itself, which has been prospected to a certain extent before, lies to the north and east of the Northern Rhodesian Copperbelt and is bounded to the west by the Union Minière. It would not be unreasonable to suppose that this area might contain economic deposits of copper.

65 PER CENT OF J.P.S. PROFITS FOR VAAL REEFS

With the annual reports of the Klerksdorp mines of the Anglo American group comes further information regarding the joint uranium production scheme formed between Vaal Reefs and Western Reefs earlier this year. (See pages 494 and 495).

The joint production scheme has been formed in order to take the best advantage of the higher uranium grade at Vaal Reefs and the lower operating plant costs at Western Reefs. The Vaal Reefs plant is being closed down and a pipeline is being laid in order to ship the slimes across to Western Reefs. It has been agreed that the costs, and in turn the profits, shall be shared between the two mines in the proportion of 65 per cent to Vaal Reefs and the remainder to Western Reefs.

This represents the approximate relationship between the profits that the respective mines would have made under the original contracts and seems to be a reasonable arrangement for the shareholders of both companies which in the long run stand to receive greater profits now than under the old scheme albeit over a longer period. There is also the advantage that the producers should be in a strong position to compete in an open uranium market should it develop after 1970.

At Vaal Reefs the sinking of the main and ventilation shafts of the No. 2 shaft system has been completed and it is anticipated that the extensions to the reduction plant will be completed this month. In anticipation of the commissioning of the No. 2 shaft system, development has

Pros the Congo Pedicle

been pushed ahead in the area south of the major Kroomdrai fault. To date 84.3 per cent of the footage sampled has proved payable at 756 inch-dwts. for gold and 58.46 inch-lbs. for uranium. This is better than the average values for the mine as a whole.

The new No. 4 shaft at Western Reefs is to be started next month and it is estimated that this shaft system will cost almost £3,000,000. It is sited in the north eastern section where, apart from the limited development from the 62 Haulage West ex the No. 3 shaft, very little is known. No separate results have been given for this development though the chairman, Mr. J. W. Shilling, has refered to it as most encouraging.

The interests of the company in the Nooitgedacht property have again been increased this year. Western Reefs have already applied for a mining lease over 636 morgen of the 1,037 morgen previously held under prospecting licences and this has been augmented by a further 1,183 morgen.

WESTERN DEEPS IN PRODUCTION BEFORE SEPT., '62?

Further to the new capital plans for Western Deep Levels, discussed in these columns last week, the chairman Mr. H. F. Oppenheimer, has confirmed the expectation that the first stage of production will be reached by the third quarter of 1962. In fact it is hoped that, if development continues to be as promising as it has been already on the V.C.R. then it will be possible to commence production some time earlier. It is estimated that the capital expenditure during the current year will amount to £9,608,000, as compared with £5,859,487 during 1960. (See page 495).

Pending the outcome of the rights issues this May the company has made temporary loan arrangements with the Anglo American Corporation. The directors have borrowing powers of up to £15,000,000.

LITTLE ENCOURAGEMENT AT FREDDIES

In his statement to shareholders of Freddies Consolidated, Mr. D. A. B. Watson has outlined both the immediate and the future programme for this Free State mine. During 1960 there have been two major disappointments, firstly the generally declining values on the basal reef and secondly the fact that the Elsburg reefs are some 500 ft. further above the prospect haulage than was originally anticipated. These two factors have considerably aggrevated Freddies financial position but the chairman has made it clear that it is their intention to investigate the Elsburg reefs as fully as possible. (See page 489).

The drop in values on the basal reef has meant that the losses encurred in producing from this sector are increasing and it may well prove to be more economic to close this section completely and to maintain the mine on a care and maintenance basis only whilst the exploratory programme is completed. The decision for the future must depend upon the results from the Elsburgs but in the event of these being disappointing the directors have suggested that it may be worthwhile to retain the company's mining title and some other assets pending an increase in the price of gold.

NO SHORTAGE OF CAPITAL AT WESTERN AREAS

Western Areas continues to advance successfully and has a great advantage over its near neighbour Western Deep Levels in that the capital so far provided, together with the remaining amount to be called in December, will be sufficient to bring the mine to production. This does depend, of course, on the percentage payability and values disclosed in the reef development, but on the information available at present there is no reason for misgivings. (See page 493).

The development programme now being followed is to drive from the ventilation shaft east and west on the 36 and 38 levels. The deeper levels will be developed from the main shaft later this year. It is anticipated that between 30,000 and 40,000 feet will be developed during the first nine months of this year.

The milling, which at least in the early stages will be done at Randfontein, should be commenced in the first half of 1962 and whilst at both the main shaft and the mill there is the capacity for 100,000 tons per month, the initial milling rate must depend to a large extent on the values disclosed in development this year.

JOHNNIES' OLDER PRODUCERS

Randfontein is one of the mines which has sold a portion of its uranium contract following the stretch-out agreements. It is now planned to operate the mine over the remaining five years of the uranium contract on the highest uranium grade possible, which will have the effect of maximizing the profits available from the uranium section. It has been estimated that during 1961 the total profit, including royalty revenue, will be of the order of £1,700,000. This figure is net of uranium loan repayments.

Government Gold Mining Areas is also affected by the uranium stretch-out agreements, though only indirectly through its pyrite production. Quite obviously with the uranium contracts running over an extended period the demand for pyrite has also been reduced when considered on an annual basis, but the chairman has indicated that over the full period the revenue to the company and in turn to the shareholders will be unaffected. (See page 492).

MURCHISON'S EXPLORATION PROGRAMME CONTINUES

In the report for 1959, the chairman of Consolidated Murchison, Mr. S. G. Menell, outlined a development programme for this South African antimony producer. (*Mining Journal*, May 27, 1960). In this year's report it has been announced that this programme is being vigourously pursued and, whilst no new orebodies of any significance have been discovered, a number of possible areas have been indicated by the geological investigations. It is intended to examine these areas by diamond drilling and

London Market Highlights

Perhaps the kindest thing that could be said about the South African gold share market during the past week was that it did not go much lower. Business dwindled to a very low ebb indeed both here and at the Cape and the relative steadiness of share prices owed a good deal to the occasional buying orders received from Johannesburg. The Algerian crisis produced little response one way or the other from Continental investors in golds.

It rather looks as though this indeterminate state of affairs will continue at least until May 31 when the Union finally becomes a republic. What happens after then is anybody's guess, but there is a chance that once isolated from the rest of the world South Africa may begin to tackle her racial problems in a more realistic fashion.

Over the three business days Anglo American showed no net change at 122s. 6d. while Consolidated Gold Fields managed to harden a few pence to 50s. Among the mines themselves, price movements were also very limited. Free State Geduld hardened a fraction to 92s. 6d. while Loraine were slightly easier at 16s. 6d. West Wits dipped to 46s. 3d. before recovering to 47s. 6d. again, but news of the high value deflection of borehole 21 was issued at the time of writing this report. In the diamond group, De Beers was one of the few stocks to encounter any selling from Paris and the shares fell 2s. 6d. to 123s. 9d. before subsequently recovering to 125s. 7½d. following reports of the collapse of the Algerian revolt.

Chartered had also been disturbed by some selling from Paris. The price of this stock dropped 2s. 6d. to 61s. 6d. but there was a partial rally to 62s. 6d. on Wednesday. Other coppers moved narrowly in very quiet trading conditions. The undertone of the market was reported as being steady enough and helping matters was the growing evidence of an upturn in U.S. demand for copper. Roan (5s. 9d.) and R.S.T. (10s. 3d.) hardened in front of the March quarter's results which it was hoped might mirror the upturn in royalty revenue received in the same quarter by Chartered. The interim dividends from the first two companies are also imminent but few market observers were prepared to comment on their likely size other than to say that a small reduction would cause no surprise.

After its recent advance the tin section settled down to a much quieter state of affairs. London profit-taking neatly balanced a fresh demand from Singapore. But the undertone remained very firm even though buyers were understandably becoming much more selective. In the circumstances some shares which are largely unknown in London suddenly came to the fore. Tongkah Harbour and Berjuntai, for instance, were still sought after by the Eastern buyers, but there was a sharp setback in Hongkong and Idris after the recent upward surge of prices. Towards the middle of the week Renong suddenly came to life with an advance of 3s. 6d. to 18s. 3d.; the buying in a rather narrow market came from the East and it was wondered if a take-over deal from Chinese sources might be in the offing.

underground development. (See p. 493).

In the meanwhile, the bulk of the production continues to come from the Gravelotte section. During the past year, to December 31, 1960, over 22,000 tons of concentrates and cobbed ore were produced, and despite an increase in cost of over 9s. per ton milled, the working profit has increased by some £20,000. The increase in cost is almost entirely due to the additional development and diamond drilling which is being done in connection with the exploration programme. The rise in revenue, which has more than offset this additional cost, is the result of the higher price realized for the antimony and the additional revenue received for the gold production which has increased this year by some 1,500 ounces.

A SUB-VERTICAL AT VIRGINIA

More details of the arrangements between Harmony and Virginia have now been announced. In his address to members of Virginia, Mr. S. G. Menell has outlined the company's plans for exploiting the areas taken over from Harmony for a period of six years

In order to exploit the "A" area, the northerly of the two areas which lie on the common boundary, it will be necessary to sink a 20 ft diameter sub-vertical shaft from the Virginia 31st level to a depth of some 900 feet in order to connect up with the Harmony 14th level. It will also be necessary, in order to speed up the exploitation of the area, to sink a sub-incline shaft from the same level to connect with the Harmony 6th level. This incline will allow a certain amount of work to be done in the upper levels pending the commissioning of the sub-vertical.

It is estimated that this work together with some additional development in the "B" area which can be exploited as a normal extension to Virginia's mining programme will cost £1,166,000 during the current year.

In addition, £225,000 will be required this year in respect of the first two instalments on the purchase from Harmony of its Area "A". These two items together are about £600,000 in excess of net liquid assets as at December 31 last, and it thus seems inevitable that further loan financing will have to be negotiated this year.

D.T.R. AGREEMENT WITH PAKISTAN

The new double taxation agreement signed this week in London between the U.K. and Pakistan has been dated retrospectively to April 6, 1960. This is the date on which the previous agreement ceased to operate. The agreement relates to taxes on income and is of benefit to U.K. shareholders who are holders of Pakistani stock.

★

The offer made by the Ghana State Mining Corporation for the shares of Bibiani (1927) having become unconditional, the following directors have resigned: Major-General Sir Edward L. Spears, Mr. H. C. Drayton, Mr. R. G. H. Linzee, Lord Luke, Mr. N. A. Pannell, M.P., and Sir David Waley. The following have been elected to the board: Mr. E. Ayeh-Kumi, chairman; Sir Charles W. Tachie-Menson, Mr. T. E. Anin, Mr. G. Munro, Mr. B. K. Pentsil, Mr. A. E. T. Adjei, alternate to Mr. E. Ayeh-Kumi and Mr. S. H. Robinson, alternate to Mr. G. Munro.

VIRGINIA ORANGE FREE STATE GOLD MINING COMPANY, LIMITED

(Incorporated in the Union of South Africa)

MR. S. G. MENELL'S REVIEW

The Annual General Meeting of Virginia Orange Free State Gold Mining Company Limited will be held on May 29 in Johannesburg.

The following is the circulated statement of the chairman, **Mr. S. G. Menell**:

During the year under review operations were adversely affected by the power cuts imposed during March, 1960, and by an accident at No. 1 shaft on July 28, 1960. This resulted in the milled tonnage for the year of 1,515,000 tons, being 31,000 tons less than in 1959. The loss caused by the accident at No. 1 shaft was fully covered by insurance, £150,901 having been received for loss of profits and standing charges, and £15,764 for material damage.

The recovery grade decreased by 0.439 dwt. to 4.313 dwt. per ton and despite a decrease in working costs of 1s 5d. per ton milled, there was a net working loss from gold production of £103,651 as compared with a working profit of £191,694 in the previous year.

Production of uranium which was 3,860 lb. less than in 1959, was sufficient to ensure that the quota of 645,876 lb. was fulfilled. The working profit from uranium decreased by £25,572 to £1,747,972 and that from acid production decreased by £2,408 to £364,326. The total working profit from all operations was thus £2,008,647. After the addition of sundry non-mining revenue £186,582 and the deduction of debenture loan stock and other interest amounting to £380,457, the next excess of income over expenditure for the year was £1,814,772, a decrease of £118,030 compared with the previous year.

Development footage in the company's lease area decreased by 33,929 feet to 48,267 feet and footage sampled decreased by 17,715 feet to 26,880 feet. Most of the reef development was advanced in the eastern and south-western portions of the mine, where payability and values again proved disappointing. Payability increased from 26.3 per cent to 27.6 per cent and the gold and uranium values increased from 283 inch-dwt. and 23.21 inch-lb. to 288 inch-dwt. and 24.67 inch-lb., respectively.

Ore Reserves

The available ore reserve declined by 263,000 tons to 1,237,000 tons at an average value of 4.97 dwt. of gold and 0.446 lb. of uranium oxide per ton, while the unavailable ore reserve increased by 450,000 tons to 1,251,000 tons at 5.85 dwt. of gold and 0.689 lb. of uranium oxide per ton. The net increase in the total ore reserve was thus 187,000 tons.

The net capital expenditure during the year under review amounted to £183,804. The major items of expenditure were:

Additional underground pumping capacity	...	£84,462
Uranium & acid plants	...	£47,406
Ventilation	... ...	£44,006

On February 24, 1961, judgment was given in the action instituted against your company and Merriespruit (Orange Free State) Gold Mining Company Limited ("Merriespruit") to restrain them from discharging underground water into Doornpan. In terms of the judgment Virginia and Merriespruit have been interdicted and restrained from pumping water on to the farm, Erfdeel No. 188 being a portion of the Doornpan pan area; the order is operative and effective as from May 1, 1961, although the right has been reserved to Virginia and Merriespruit to institute, jointly or severally, such proceedings as they may deem fit for the revocation or qualification of the order. An appeal has been noted, but alternative arrangements to deal with the position can be made should the appeal be unsuccessful. As previously advised, Merriespruit had no interest in the pan, and was indemnified by Virginia and the other companies using the pan.

Development Plans

By circular dated April 4, 1961, members were advised fully of the arrangements now proposed with Harmony Gold Mining Company Limited ("Harmony") and Merriespruit, and matters arising thereout.

If these arrangements are approved by members, your Board's plans for exploiting the areas to be acquired from Harmony are as follows:

To exploit Area "A" of the Harmony Area a 20 foot diameter sub-vertical shaft will be sunk from the 31st level at a position approximately 6,250 feet north of No. 1 shaft to a depth of approximately 900 feet below the 31st level and will be connected to the 14th level in the Harmony mine. It will also be necessary to sink a sub-incline shaft from Virginia 31st level to Harmony 6th level for the early exploitation of the area above that level, pending the commissioning of the sub-vertical shaft.

An original waterway from the 21st to the 31st level (situated approximately 100 feet north of No. 1 shaft) which had been commissioned as a sub-incline shaft to the 28th level, for the purpose of hoisting waste to No. 2 shaft, has been sliped and equipped to the 31st level and is being deepened to 210 feet below this level. A waste loading box will be installed in the new portion of the shaft to allow of waste rock being hoisted from the 31st level. Agreement has been reached on the ventilation and pumping arrangements in Area "A" and Harmony will assist with the development of this Area on Virginia's account. Exploitation of Area "B" will be done as a normal extension of Virginia's present mining programme.

Capital expenditure for the current year is estimated at £1,166,000, mainly due to the expenditure on the shaft systems to implement the Harmony arrangements which I have mentioned above and also to include development and other work in connection with the exploitation of Harmony Area "A".

Kennecott Copper Corporation announce that Mr. F. R. Milliken has been elected president, in succession to Mr. C. R. Cox, who will continue as a director and member of the executive committee.

FREDDIES CONSOLIDATED MINES LIMITED

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1960. (Issued to Members prior to the Seventh Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Friday, May 5, 1961, at 11 a.m.).

Accounts

For the year 1960 the working loss arising from combined gold and uranium operations amounted to R227,298 (£113,649) (1959—£67,134). The net loss for the year, after bringing into account the company's contribution towards the Atomic Energy Board's uranium research programme, interest paid on loans, interest received, sundry revenue and other minor items, amounted to R233,930 (£116,965) (1959—£68,284).

The excess of debtors, gold in transit, and cash over current liabilities at March 31, 1961, amounted to R89,282 (£44,641), which sum excludes loans from Johannesburg Consolidated Investment Company Limited, National Finance Corporation and certain Building Societies, totalling R1,656,114 (£828,057).

Operations—1960 and 1961

Details of the operations conducted during the year 1960 are given in the directors' report. As anticipated, it became necessary during that year to curtail development in order to reduce expenditure. This had a relatively small immediate effect on the ore reserves as calculated at December 31, 1960, but did significantly affect the availability of stoping faces and continues to do so to an increasing extent.

Two major disappointments were encountered during 1960. Firstly, there was a further serious decline in the value of the development on the Basal Reef. During the past three years there has been a continuous decline in the average value of all reef development sampled, coupled with a decline in the average value of the payable reef development. The following tabulation shows the figures for the years 1958 to 1960 inclusive :

	Average value of all development sampled inch-dwts.	*Percentage payable*	*Value of payable development sampled inch-dwts.*
1958 ...	319	61	416
1959 ...	302	64	379
1960 ...	261	54	342

The effect of these diminishing values on the value of the ore available for stoping was felt to a lesser degree during 1960 than had been anticipated, but it would be unrealistic to expect that the value of the ore available for stoping during 1961 will not be materially and adversely affected by the low values obtained in development during 1960.

The second main disappointment was in connection with the exploratory work being carried out in an attempt to prove the Elsburg Reefs which may lie along the western boundary of the mine. Geological evidence had indicated that the Elsburg Reefs would lie some 300 feet vertically above the position of the haulage which was being driven to the western boundary of the mine for the purpose of exploring these reefs. The work of developing this haulage proceeded according to plan, but during the final stages of development it was found that the reefs lie more than 300 feet and possibly as much at 800 feet above the elevation of the haulage. Diamond drilling from the haulage commenced in December, 1960. It was then found that the strata intervening between the haulage and the Elsburg Reefs was of a friable nature, in particular the 150 feet of shales underlying the "B" Reef, which is situated between the haulage and the probable position of the Elsburg Reefs. These shales caused considerable difficulty in the underground drilling programme and resulted in the abandonment of two boreholes, one having been drilled a distance of 604 feet and the other a distance of 401 feet. At the present date a third borehole has succeeded in traversing the "B" Reef shales and it is expected that this hole will be successful in intersecting the Elsburg Reefs within the next four to six weeks. Because it is important to obtain information about these reefs and because the difficulties of drilling to them from underground were much greater than had been anticipated, it was decided early in 1961 to drill to the Elsburg Reefs from the surface as well. Surface borehole E.R.K.2 is in progress and is situated halfway between borehole E.R.K.1 and the underground position of 18 North 2 Haulage West. On April 14 it had reached a depth of 1,995 feet and is expected to reach the desired horizon at a depth of approximately 4,700 feet below collar.

It was expected that information regarding the Elsburg Reefs would become available towards the end of 1960 and during the first quarter of 1961, but the unexpected difficulties encountered in drilling from the end of 18 Haulage West have delayed the acquisition of this information.

Present Outlook—Basal Reef

The working loss arising from gold mining operations alone and excluding uranium revenue has been of the order of R1m. (£½m.) per annum during each of the last three years while, during the first quarter of 1961, the loss from gold mining amounted to R163,501 (£81,751), having been reduced below the average of previous years by the curtailment of development in 1960. The outlook for the year 1961 is nevertheless more unfavourable than has been the case in the preceding three years, since the shortage of working faces will become more acute owing to the curtailment of development, whilst the drop in sampled value of the development carried out in 1960 must inevitably have some adverse effect on the grade of ore milled during the current year.

Until January 1, 1961, gold mining operations have resulted in the production of uranium-bearing slimes which, after treatment, provided revenue and this to a substantial extent offset the working losses arising from gold mining. The extent of the revenue derived from uranium was directly related to the scale of mining and milling operations for gold. As from January 1, 1961, the tonnage quota attached to the O.F.S. Joint Production Scheme was transferred to other producers against the payment of a royalty by them. The uranium-bearing slimes produced by this company are not therefore now being treated and its share of the royalty payments which amount to approximately R800,000 (£400,000) per annum is not related to the scale of gold mining operations, which therefore no longer produce revenue from uranium but produce revenue from gold only.

Shareholders have in previous years been informed that mining operations on the Basal Reef alone could not be carried on at a profit, and that the only two factors likely to improve that position were an increase in the price of gold or the discovery of payable reefs on other geo-

SUMMARY OF RESULTS

PRODUCTION	**1960**		**1959**
Tons milled	726,000		708,000
Gold—ounces fine	159,335		169,952
Recovery per ton—dwts.—gold	4.389		4.801
Tonnage apportioned to this company under joint uranium production scheme ...	724,941		706,927
Uranium oxide—lbs. apportioned	215,510		224,887
Yield per ton on lbs. of uranium oxide apportioned	.297		.318
ORE RESERVES at December 31			
Tonnage	800,000		1,005,000
Stope value—dwts.—gold	5.3		5.5
Stope value—lb.—uranium oxide	0.34		0.33
FINANCE	**1960**	**1960**	**1959**
Working loss, after providing for this company's share of the pumping, treatment and amortization charges in terms of the joint uranium production scheme	R227,298	£113,649	£67,134
Net outgoings after taking into account recoupments of capital expenditure, interest on loans sundry revenue, interest received and various other minor items	R157,884	£78,942	£65,560
FINANCIAL POSITION at December 31			
Stores and materials on hand	R528,996	£264,498	£295,948
Excess of cash and debtors over current liabilities	R135,440	£67,720	£105,738
Loans from National Finance Corporation, Johannesburg Consolidated Investment Company Limited and building societies ...	R1,702,416	£851,208	£841,734
Net deficit, being loans less stores, materials, cash and net debtors	R1,037,980	£518,990	£440,048

logical horizons within the company's mining area.

Exploration of Elsburg and "B" Reef Horizons

Previously when operations in respect of gold and uranium combined have resulted in losses of reasonable proportions, the purpose of exploration has been to discover, if possible, some additional ore on the Elsburg and "B" Reef horizons which would enable the rate of production to be increased or the value of the ore stoped to be increased, or both, and thus allow combined gold and uranium mining operations to continue at a profit. Under current conditions when the mining of the Basal Reef for its gold content no longer controls the revenue derived from uranium, the objective in continuing the exploration of the Elsburg and Basal Reefs is somewhat different. The tonnage now sought is not required merely to be incremental to the present main source of tonnage, i.e. the Basal Reef, the mining of which for gold alone will under current conditions inevitably give rise to substantial losses. On the contrary, it is required as a replacement of the Basal Reef and, in consequence, will have to be of a higher value and available in greater quantities than was formerly the case.

The possibility of finding such tonnages of ore of the necessary value on the "B" Reef is remote, the history of this reef in neighbouring properties being somewhat discouraging. However, payable "B" Reef was intersected in the original drilling of the lease area in borehole E.V.1 and, before abandoning the possibility of carrying out profitable gold mining operations, it is desirable to investigate these reefs in the vicinity of that borehole. A haulage which is being developed towards it has already once intersected the "B" Reef which, owing to faulting, will be encountered three times between the starting point of the haulage and borehole E.V.1. Some development has been carried out at the point of the first intersection and this proved to be unpayable, giving a value of 1.3 dwts. over 92 ins., equivalent to 117 inch-dwts.

With regard to the Elsburg Reefs, shareholders have previously been informed that there is considerable doubt as to whether the payable reefs on this horizon continue southwards from the property of the Loraine Gold Mining Company into the mining area of Freddies Consolidated Mines. However, the possibility that they might do so cannot be ignored and it would be incorrect to decide to abandon the mine at this stage without having previously proved the issue one way or the other.

The published value of the development carried out on this horizon by Loraine Gold Mining Company from No. 3 Shaft situated some 11,500 feet north of the Freddies/Loraine common boundary discloses that 595 feet, equivalent to 53.8 per cent of the total reef development sampled, proved to be payable with an average sampled value of 792 inch-dwts. The last borehole intersection on the common boundary between the properties of the Loraine Gold Mining Company and Freddies Consolidated Mines, namely in E.R.K.1, which is 11,500 feet south of Loraine No. 3 Shaft area gave a borehole value of approximately 1,000 inch-dwts. 6,500 feet south of E.R.K.1 borehole P.P.1 failed to intersect the Elsburg Reefs which, quite possibly, do not exist at this point. Borehole E.R.K.2 should provide some information as to whether the values obtained in the development at No. 3 Shaft of the Loraine Gold Mining Company and in borehole E.R.K.1 persist for an appreciable distance into the property of Freddies Consolidated Mines. Should they do so, they might provide sufficient tonnage at a value adequate to provide some measure of profit from the exploitation of these reefs either at this stage or at some future stage. It is in any event desirable to determine, if possible, whether the reefs on this horizon are likely to constitute an asset in Freddies' hands.

Immediate Policy

While the information regarding the Elsburg Reefs is being obtained, it is advisable to keep the mine in production and not to abandon it or allow it to flood. Production on the Basal Reef horizon will, if possible, be continued together with the development of the exploratory tunnel to the "B" Reef, pending the completion of the drilling programme. The period of time during which operations on the Basal Reef horizon can be continued will depend upon circumstances and upon whether such losses as are incurred materially exceed the estimated cost of placing the mine on a caretaking basis while drilling continues. Operations will be so conducted as to minimize losses and a further curtailment of development will be necessary in the near future.

Future Policy

If at some stage it becomes clear that there is no possibility of keeping the mine open and if it at that time appears desirable to maintain the company's mining title and possibly certain other assets to provide for the potential future exploitation of the mine after an increase in the price of gold, it will then be necessary to decide how this can be done most economically. Caretaking might be carried out in two ways; firstly, by removing all the equipment underground in the mine and allowing the mine to flood. The cost of maintaining the company's mining title and of caretaking the property would be by no means negligible, while the cost of dewatering the mine and re-entering it and re-equipping it for future operations in the event of an increase in the price of gold would be considerable. The second basis for caretaking would be to strip the mine of only the more expendable and valuable underground equipment and, thereafter, to continue to operate the pumping services, keeping the mine dry and ready for re-entry and re-development. The annual cost of caretaking on this basis would be greater than that of caretaking the mine in a flooded condition, but the cost of re-entry would be considerably less.

The relative overall cost of the two methods would depend upon the length of time the mine has to be maintained on a caretaking basis. An examination of the problems indicates that if the period of caretaking is less than four years, then the cheapest method would probably be to keep the mine dry and available for re-entry. If the period of caretaking is for more than four years, then it would be cheaper to allow the mine to flood. There is, of course, no way of determining the probable duration of the caretaking period. Whichever method is followed, a significant amount would be expended in maintaining title and caretaking for an indefinite period of time while awaiting an event which may not in the end materialize.

As a preliminary to arriving at a decision as to the best course to be pursued in the interest of shareholders, it remains the opinion of your Board that the potentialities of the Elsburg Reefs should first be explored by the drilling programme outlined earlier. When information is available regarding these reefs, a decision can then be made as to whether

(1) To continue mining operations, should this prove possible, or
(2) To dispose of the whole of the company's assets, or
(3) To retain the mining title and, possibly, some portion of the other assets and to place the mine on a caretaking basis pending an increase in the price of gold.

Staff

In conclusion, I would like to place on record the Board's appreciation of the excellent services rendered under the most trying conditions by the mine manager, Mr. C. J. Shaw, and the employees at the mine and the technical and secretarial staffs at the head office.

April 26, 1961.

THE GERMAN INDUSTRIES FAIR

The German Industries Fair is being held in Hanover from April 30 to May 9.

The Morgan Crucible Group will be exhibiting a range of their products on Stand No. 119, Hall 3.

Featured on the stand will be three furnaces. A 500 lb. (225 kg.) aluminium capacity Morgan Oil-Fired Basin Tilting Furnace, a 200 lb. (100 kg.) aluminium size Morgan Crucible Bale-Out Furnace (both manufactured under licence from Morganite Crucible Ltd., by Elino Industrie—Ofenbau, Firma Carl Hanf & Co.) and a high temperature electrically heated muffle furnace fitted with Crusilite elements (elements manufactured by Morganite Electroheat Ltd.)

Sherwen electromagnetic vibrating equipment will be displayed at the Hanover Fair on the stand of Pintch Bamag, AG (Stand No. 1004b) who are licensed to manufacture the equipment by The General Electric Company Ltd. of England. Included on the stand will be a light-duty feeder, a standard heavy-duty feeder and a closed-circuit demonstration model.

The light-duty feeder incorporates the latest developments that have taken place in the design of the vibrators fitted on Sherwen equipment. These developments include a totally-enclosed springing system using rubber in shear in place of the usual batteries of coil or leaf springs. To indicate the range of Sherwen feeders available, the light-duty unit will be contrasted with a heavy-duty 48 in. by 6 ft. feeder capable of handling up to 400 tons of material per hour.

THE RANDFONTEIN ESTATES GOLD MINING COMPANY, WITWATERSTAND LIMITED

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1960. (Issued to Members prior to the Sixty-eighth Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Thursday, May 4, 1961, at 11 a.m.).

Accounts

The profit for the year, after taking into account gold and uranium profits, interest paid on uranium loans, the contribution towards the cost of the Atomic Energy Board's uranium research programme and other items of revenue and expenditure, amounted to R3,935,684 (£1,967,842) before tax, which compares closely with the figure of R3,937,786 (£1,968,893) for 1959.

Dividends declared in 1960 absorbed R1,219,066 (£609,533), while the carry forward on Appropriation Account remained virtually unchanged at R600,452 (£300,226).

Operations

Gold Division

The profit arising from gold mining amounted to only R68,428 (£34,214). Mining operations on the gold reefs are being conducted on a small scale and will be continued for as long as they can be of benefit to the company, but will probably be terminated during 1961.

Within its mining area this company has an appreciable tonnage of low-grade gold-bearing ore which is not payable at the present price of gold but which would be of interest if the price of gold rose substantially.

Uranium Division

The scale of operations in the uranium division was reduced slightly as compared with the previous year owing to an increase in the recovery grade of uranium oxide per ton milled from .945 pound per ton in 1959 to 1.012 pounds per ton in 1960, the quantum of uranium oxide produced being as in the past governed by the company's sales quota.

Development footage accomplished during the year was lower at 116,414 feet compared with 142,409 feet in the previous year. Percentage payability decreased slightly and there was a moderate increase in sampled value.

New Uranium Sales Arrangement

Uranium sales in 1960 were governed by the original sales contract which was cancelled at the end of that year The balance of the tonnage of uranium oxide to be supplied by the joint plant during the four years ending December 31, 1964, in terms of the original contract amounted to 3,880 tons and this tonnage will now be supplied under a new arrangement which has been made with the purchasers. Details of the new arrangement were set out in the directors' report for 1960.

The main features of the new contract for uranium supply are summarized below :

(i) The contract period has been extended by one year to December 31, 1965, and the delivery rate is reduced progressively over the five-year period.

(ii) Of the total tonnage to be supplied, an amount of 880 tons will be supplied by other producers. This amount will be delivered in roughly equal annual instalments over the five-year period. The transfer of this portion of the company's quota has been made against the payment to this company of a royalty which will accrue monthly and will be taxed as non-mining revenue.

(iii) The remainder of the total quantity to be supplied, amounting to 3,000 tons, will be produced at the Randfontein joint plant from slimes contributed as in the past by this company and, to a small extent, by the East Champ d'Or company. The quantity to be supplied by East Champ d'Or during the four years to December 31, 1964, will depend on that company's ability to maintain production and Randfontein's production will be adjusted from time to time to the minor extent necessary to compensate for any variations which may be made in East Champ d'Or's output.

Future Mining Operations

In general, production at the mine will decline in annual stages to conform with the new sales schedule. The progressive curtailment of operations each year will, in the event of final closure at the end of the contract period, enable this to be carried out more simply and with significant resultant economies compared to the more abrupt closure which would have followed upon the continuance of the full-scale operations as required under the old contract.

The rate of milling will be reduced relatively slowly during the first half of 1961, and thereafter will be reduced more rapidly. As part of the revised mining programme, every effort will be made to increase the grade of ore mined, but such an increase in grade can only be achieved after a decrease in the milling rate and will only come about gradually in the first instance.

The realignment of operations will be a continuous process over the five-year period of the new contract. The intention will be to extract only that ore which will give the highest profit during this period, leaving *in situ* ore which, being payable, would under a less restricted outlook for sales be mined in conjunction with the higher grade ore. The earning of the maximum profits during the relatively short period of the contract will be the overriding consideration in deciding upon mining policy. At the same time the desirability of leaving the mine and its substantial remaining tonnage of ore reserves in a suitable state of preparedness for continued or renewed operations after 1965 will be borne in mind. Under present conditions of world markets it is highly unlikely that the production of uranium would in fact continue without interruption after that date.

Future Outlook

During the current year sales from the joint plant will be 788 tons, the probable production by this company alone being 730 to 740 tons. This production will not be spread evenly over the year, the greater portion falling due for supply during the first half of the year.

It is estimated that the average total monthly profit during 1961 will be of the order of R280,000 (£140,000), made up of royalty revenue of approximately R158,000 (£79,000) from the quota transferred and approximately R122,000 (£61,000) from mine production and general revenue, after providing for interest on and repayment of the uranium loans.

As a result of new arrangements under the revised contract whereby payment is related to the actual shipment of uranium sold, stocks of unsold uranium will be built up from time to time. Prior to

(continued overleaf)

SUMMARY OF RESULTS

	1960		1959
PRODUCTION			
GOLD DIVISION			
Tons milled	260,000		415,000
Gold—ounces fine	49,719		71,949
Recovery per ton—dwts.	3.824		3.467
URANIUM DIVISION			
Tons milled	1,804,000		1,957,000
Uranium oxide—lbs.	1,826,028		1,850,129
Recovery per ton—lbs.—uranium oxide	1.012		.945
Gold—ounces fine	92,614		98,898
Recovery per ton—dwts.—gold	1.027		1.011
URANIUM OXIDE SOLD—lbs.	1,828,676		1,841,240
ORE RESERVES at December 31			
GOLD DIVISION			
Tons	100,000		285,000
Stope value—dwts.	4.9		4.7
URANIUM DIVISION			
Tons	2,007,000		1,921,000
Stope value—lbs.—uranium oxide	1.3		1.3
FINANCE	**1960**	**1960**	**1959**
Profit before taxation	R3,935,684	£1,967,842	£1,968,893
Taxation (excluding adjustment for previous			
Dividends paid—Amount	R1,219,066	£609,533	£812,711
Per share	30c	3s. 0d.	4s. 0d.
Unappropriated profit carried forward	R600,452	£300,226	£329,337
year)	R1,200,000	£600,000	£531,800

June 30, 1961, a certain tonnage will be produced but not sold until after July 1, 1961. This position will arise at the end of each six-monthly period until the end of the contract. On December 31, 1961, these stocks may amount to the better part of one month's production and may have to be financed by means of temporary loan facilities until sale is effected.

Capital expenditure for 1961 is estimated to amount to R220,000 (£110,000). Thereafter, expenditure on capital account is likely to be at a low level.

The outlook for the remaining years of the contract, after 1961, will depend on the trend of the general cost structure of the mining industry and on the degree of success attending efforts at the mine to increase the grade of ore mined and to control working costs in the face of a reducing scale of operations. It is at present anticipated that the probable increase in cost per ton milled will be compensated for by an increase in the grade of ore milled and that, under prevailing circumstances, the average cost per pound of uranium oxide produced from 1962 onwards will not therefore increase above current levels.

Staff

In conclusion I would like to place on record the board's appreciation of the excellent services rendered by the general manager, Mr. G. W. Holl, and the employees at the mine and the technical and secretarial staffs at the head office.

April 26, 1961.

GOVERNMENT GOLD MINING AREAS MODDERFONTEIN) CONSOLIDATED LIMITED

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1960. (Issued to Members prior to the Fifty-first Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Friday, May 5, 1961, at 2.15 p.m.).

Financial

As a result of the year's operations, the net funds available for distribution amounted to R501,304 (£250,652) (1959 — £331,544). An amount of R700,000 (£350,000), equivalent to 12½c. (1s. 3d.) per share, was returned to members during the year by way of returns of capital, thus reducing the balance of unappropriated profit carried forward to the current year by R198,696 (£99,348).

Operations

Gold Division

Gold mining operations and the treatment of accumulated gold-bearing residues continued throughout the year, together with the salvage of mining equipment. Profits from these operations, together with revenue from the sale of salvaged material and from sundry sources, amounted to R43,154 (£21,577) (1959 — £22,356). Towards the end of 1960 revenue began to decline and small losses were incurred during the first quarter of the current year.

Steps have been taken to close down operations on the Kimberley Reef horizon, where reserves of payable ore have virtually been depleted. It is expected that milling operations will be continued at the rate of about 35,000 tons per month throughout 1961 and probably at some further reduced rate for part of 1962. It is not anticipated that profits of any consequence will arise from these operations and in fact small losses may be incurred from time to time. It is however, in the interests of members that these operations should be continued for as long as possible in view of their beneficial effect on the application of the formula used for calculating the State's share of the profits earned on combined operations, including the production of pyrite. It is of interest to note that, after the cessation of mining operations and the treatment of gold-bearing residues, the operation of the company's lease formula is such that the current rate of payment of the State's share of profits will be more than doubled.

Pyrite Production

Sales of pyrite concentrates during the year amounted to 192,856 tons as compared with 189,052 tons during the previous year.

The net revenue derived from these sales, after providing for the payment of interest on and redemption of the pyrite loans raised for the project, amounted to R552,850 (£276,425) as compared with £276,940 during the previous year.

Reference has been made in the directors' report to the new arrangements recently entered into between the Atomic Energy Board of South Africa and the purchasers of uranium produced in South Africa and to the fact that these arrangements will undoubtedly affect the demand on this company for the supply of pyrite for the manufacture of sulphuric acid used by the uranium industry.

Details regarding revised delivery rates and pricing arrangements to meet the changed circumstances are under discussion with the purchasers and finality has not as yet been reached. It is expected that the final arrangements will be such that, notwithstanding an immediate reduction in the current level of monthly earnings from pyrite production and a consequential deferment of revenue, the amount available for distribution to members will in total be of approximately the same present value as the amount which would have been earned in terms of the present arangements.

It is not possible at this stage to state the rate at which the producers of sulphuric acid will purchase pyrite from this company from month to month and year to year during the period of the new agreement. Pyrite sales will, however, certainly be curtailed over the next few months whilst the surplus stocks of pyrite at present held by the acid producers are worked down. Thereafter, production of pyrite will continue at a level lower than the current level. Until the arrangements at present under discussion are finalized, it is not possible to estimate the future rate of profit from pyrite production.

As mentioned in the directors' report, arrangements are being made to repay this company's pyrite loan prior to June

SUMMARY OF RESULTS

PRODUCTION	**1960**		**1959**
PYRITE			
Slimes treated—tons	2,490,400		2,301,600
Pyrite concentrates produced—tons	192,726		189,052
GOLD			
Tons milled	632,000		635,000
Gold recovered from current milling—ounces fine	106,664		114,731
Recovery per ton—dwts.	3.375		3.614
Gold recovered from treatment of accumulated old residues—ounces fine	20,826		13,616
ORE RESERVES at December 31			
Tonnage	152,000		328,000
Stope value—dwts.	6.2		5.9
FINANCE	**1960** Rand	**1960** £	**1959** £
Profit before taxation and Government share of profits	667,532	333,766	336,052
Transfer from general reserve, being equivalent to decrease during the year in the value of stores and materials held	22,794	11,397	34,340
Net amount received from sales of mining and other assets	354	177	54,569
	R690,680	£345,340	£424,961
LESS—Payments in reduction of pyrite loans	69,748	34,874	33,531
Taxation and Government share of profits	119,628	59,814	59,886
	189,376	94,688	93,417
Net available funds from sales of gold, pyrite, redundant equipment and from sundry revenue	R501,304	£250,652	£331,544
Returns of capital			
Amount	R700,000	£350,000	£350,000
Per share	12½c	1s. 3d.	1s. 3d.

30, 1961. Funds are available for this purpose and, as from April 1, 1961, provision will no longer be made in the monthly published results for interest on and repayment of this loan.

Staff

In conclusion, I would like to place on record the Board's appreciation of the excellent services rendered by the mine management and the employees at the mine and the technical and secretarial staffs at the head office.
April 26, 1961.

WESTERN AREAS GOLD MINING CO. LTD.

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1960. (Issued to Members prior to the Second Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Friday, May 5, 1961, at 9.30 a.m.).

Operations

Progress since the commencement of shaft sinking early in 1960 has been eminently satisfactory. The main and ventilation shafts have both been completed to their final depth and the ventilation shaft has been in use for hoisting since October, 1960. The main shaft is now being equipped and it is hoped that it will be fully commissioned as the main hoisting shaft during the fourth quarter of the current year. Until then the development programme will to some extent be limited by the capacity of the ventilation shaft for hoisting rock from development, but it is nevetheless expected that from 30,000 to 40,000 feet of development will be completed during the first nine months of 1961. The main shaft when equipped will, it is estimated, provide sufficient capacity for the mining and milling of approximately 100,000 tons per month. This capacity can, if desired, be substantially increased at a later stage.

It is of interest to note that during the shaft sinking period 8,919 feet of development were carried out in excavations incidental to shaft sinking, e.g. station cutting, ore passes, etc., while the total tonnage of rock hoisted from the beginning of January, 1960, to the end of March, 1961, amounted to 633,698 tons.

Since the end of the year development has commenced on the 33rd level where intermediate pump stations are being excavated. The total development footage accomplished on this level, together with 36 and 38 levels during the period January 1 to April 14, 1961, amounted to 10,342 feet. Development in these initial stages has of necessity been confined principally to haulages driven off reef and to cross-cuts driven towards the Ventersdorp Contact Reef preparatory to rising.

The general development programme at present being followed is to drive from the ventilation shaft east and west as rapidly as possible on the 36th and 38th level haulages in order to ascertain the potential value of the ore which may be available for mining in the environs of the two shafts. Development from the main shaft should commence on the 41st level and possibly from other lower levels towards the end of 1961, when this shaft will be fully commissioned. Reef development will commence shortly on selected horizons of potential economic interest on the Elsburg Reefs and the Ventersdorp Contact Reef on 38th level. This reef development will be continued at a rate which will in part be dependent upon the hoisting capacity of the ventilation shaft until such time as the equipment of the main shaft is completed. There is at present insufficient information upon which to base an accurate forecast of the date of production. This will depend largely upon two factors: firstly, upon the speed with which the main shaft can be equipped for hoisting, and, secondly, and to a greater degree, upon the values and percentage payability of the reefs intersected on the 36th and 38th levels as these are driven away from the neighbourhood of the shaft pillar. If the reef development completed during 1961 discloses a reasonable percentage payability, it should be possible to commence milling operations in the first half of 1962 on a scale which also will be determined by the results of that development.

It is not possible at this stage to give any indication as to what programme of expansion might be followed after the mine has been brought to production. The reduction plant at Randfontein Estates is now ready to accept ore from your company's mine, and it is not proposed to make any decision with regard to the erection of a reduction plant by Western Areas until such time as a substantial footage of development has been completed on reef and significant ore reserves have been blocked out.

Financial Position

As a result of the rapid progress which has so far been made in opening up the mine, the rate of expenditure of the capital provided for this purpose has been considerably more rapid than that originally envisaged. It was therefore decided to call up the unpaid balance of 75 cents (7s. 6d.) per share on 3,970,761 of the partly-paid shares on March 1, 1961, instead of on December 1, 1961. The balance of the unpaid capital, amounting to R401,082 (£200,541), will be called on December 1, 1961. It is anticipated that the capital so far provided, together with the remaining amount to be called in December, will be sufficient to bring the mine to production. The fulfilment of this estimate, however, depends on the actual date when production is commenced which date, as stated above, will be determined by the percentage payability and values disclosed in the reef development carried out during 1961.

Staff

In conclusion, I would like to place on record the Board's appreciation of the excellent services rendered by the Mine Manager, Mr. R. J. L. Tarlton, and the employees at the mine and the technical and secretarial staffs at the Head Office.
April 26, 1961.

CONSOLIDATED MURCHISON (TRANSVAAL) GOLDFIELDS AND DEVELOPMENT CO. LTD.

(Incorporated in the Union of South Africa)

MR. S. G. MENELL'S REVIEW

The 27th annual general meeting of Consolidated Murchison (Transvaal) Goldfields & Development Company, Limited will be held on May 23 in Johannesburg.

The following is an extract from the review by the Chairman, **Mr. S. G. Menell,** which has been circulated with the report and accounts:

The reports of the directors and technical advisers give full information concerning the operations of your company for the year ended December 31, 1960. My review will, therefore, be limited to a summary of the more important features.

During the year under review the demand for antimony cobbed ore and concentrates remained firm and sales were effected at prices slightly in excess of those received during the previous year. The United Kingdom price for antimony regulus 99 per cent was increased from £190 to £200 per long ton.

Production was of a similar order to that of the previous year whilst revenue increased from £925,346 during 1959 to £1,027,425 in 1960.

Since the end of the financial year there have been further increases in the prices realized for cobbed ore and concentrates and the United Kingdom price for antimony regulus 99 per cent was further increased from £200 to £230 per long ton.

The mill was fed with ore derived mainly from the Gravelotte section, although during the latter half of the year this was augmented by tonnage mined at the United Jack and Mulati sections. It is the intention during the current and future years to obtain an increasing tonnage of ore from sources other than the Gravelotte section in order to conserve to some extent the ore reserves at this section pending the completion of the exploration programme. Present indications are that the grade of ore available in these outside sources is somewhat lower than that obtained during recent years at the Gravelotte section.

The exploration programme is being vigorously pursued with the object of attempting to find additional sources of ore either in new areas or contiguous to the current known deposits. No new ore bodies of any significance were discovered during the year, but the geological investigations carried out have indicated a number of possible areas which it is intended to test by trenching, diamond drilling and underground development.

The Council of the City and Guilds of London Institute confers each year up to five special awards on selected persons who have achieved distinction in their chosen field. Amongst the special awards for 1961 are included those to Mr. E. V. Dewhirst (metallury), F. J. Turner (non-ferrous metallurgy), K. Wardell (mining surveying).

WESTERN REEFS EXPLORATION AND DEVELOPMENT COMPANY LIMITED

(Incorporated in the Union of South Africa)

RECORD TONNAGE MILLED

JOINT URANIUM PRODUCTION SCHEME OUTLINED

The following is from the review by **Mr. J. W. Shilling,** the chairman, which has been circulated with the annual report and accounts :—

Increases in production and profits were largely due to an increase of some 81,000 tons in the tonnage milled during the year to the record of 1,663,500 tons. In addition, the yield at 5.67 dwt. per ton was 0.39 dwt. per ton higher than in 1959, and so contributed to an increase of 53,416.41 ounces in the gold produced. Working profit for uranium was higher, mainly as a result of a slight increase in the grade. These overall improvements more than compensated for the rise of 2s. 8d. in the working costs per ton milled.

Construction work started on the No. 4 shaft and actual sinking operations are due to commence in May, 1961. Underground, on 64 level at the No. 2 shaft, work has been commenced on the twin crosscuts to the No. 4 shaft site. These crosscuts are intended to provide the main connexion for the transfer of ore from workings in the No. 4 shaft area for hoisting at the No. 3 shaft.

The Year's Results

The working profit from gold and the estimated profit from uranium and sulphuric acid increased by £325,418 to £3,408,940. There was an excess of £122,682 in sundry revenue over sundry expenditure, resulting in a surplus for the year of £3,531,622 which, together with the unappropriated profit of £638,739 brought forward from 1959, gave a total of £4,170,361 available for appropriation. Of this amount taxation and the Government's share of profits absorbed £1,578,790 whilst appropriation for capital expenditure amounted to £1,169,153. Dividends of 2s. 6d. per share paid to shareholders absorbed £875,000, leaving an unappropriated profit for 1960 of £539,418. The net capital expenditure on fixed assets for the year amounted to £582,077 and it is estimated that capital expenditure for 1961 will amount to £1,614,000 of which £1,116,000 is to be spent on the construction of the new No. 4 shaft.

On December 31, 1960, the mining lease over 432 morgen of the farm Goedgenoeg was registered.

Development Results

Development on the Ventersdorp Contact and Elsburg Reefs in the old part of the mine was confined to the splitting up of known blocks but in the Goedgenoeg area more new ground was opened. The total footage driven on these reefs decreased by 9,216 feet to 13,933 feet and 48.1 per cent of the 6,435 feet sampled proved payable at an average payable value of 562 inch-dwt. for gold and 16.64 inch-lb. for uranium. On the Vaal Reef the total footage developed was 10,257 feet less than last year. Of the footage sampled 69 per cent proved payable, which compared favourably with 66.6 per cent in 1959. Results were good although there was a slight decline in the average value of the payable footage from 663 inch-dwt. for gold and 44.66 inch-lb. for uranium in 1959, to 618 inch-dwt. for gold and 39.71 inch-lb. for uranium in 1960. The best results on this reef were disclosed by development west of 62 West haulage and between this haulage and the eastern boundary on 65 and 67 levels.

In that part of the Nooitgedacht area over which the company has applied for a mining lease, the total footage driven on the Ventersdorp Contact and Elsburg Reefs was 42,932 feet, an improvement of 9,884 feet on the figure for the previous year. Of the 17,460 feet sampled 55.8 per cent proved payable, by comparison with 42.7 per cent in 1959. The payable values were also better, averaging 626 inch-dwt. for gold and 16.61 inch-lb. for uranium as compared with 553 inch-dwt. for gold and 13.86 inch-lb. uranium in 1959. Good values were encountered in development in this area near the 36 West haulage from No. 2 shaft, but to the North values so far encountered were poor.

Until the No. 4 shaft is commissioned production on the Vaal reef is unlikely to increase. The development programme has accordingly been adjusted to maintain the ore reserves on this reef at about their present level for the time being.

Ore Reserves

The latest assessment of the ore reserves in the areas which lie within the present mining lease area indicates a decline of 426,600 tons to 4,146,600 tons. The value of the ore reserves in 1960 was 7.15 dwt. per ton for gold, and 0.61 lb. per ton for uranium, as compared with 6.85 dwt. per ton for gold and 0.59 lb. per ton for uranium in the previous year. Included in these ore reserves are the reserves on the Vaal Reef horizon which rose by 69,400 tons of 2,575,700 tons at a value of 8.5 dwt. per ton for gold and 0.82 lb. per ton for uranium. The decline in ore reserves on the Ventersdorp Contact and Elsburg Reefs within the mining lease area was more than offset by the tonnage blocked out on the Ventersdorp Contact Reef beyond the mining lease boundary in the Nooitgedacht area, but the tonnage has not been included in the above reserves. If this additional tonnage is taken into acount, however, the total ore blocked out inside and outside the existing lease area amounts to 6,061,900 tons, which is 351,400 tons more than the figure at the end of 1959.

On the latest assessment, the uranium bearing slimes in the old dam amount to 5,724,030 tons containing 0.320 lb. per ton of uranium oxide.

New Arrangements for Uranium Production

The Western Reefs and Vaal Reefs companies have acquired, on a royalty basis, certain annual quota entitlements from other producers. Their combined annual quota entitlements, now amounting in all to 4,534 tons, are to be produced over the 10-year period 1961 to 1970, inclusive, in a joint production scheme set up by the two companies with effect from January 1, 1961. Delivery of the 4,534 tons is to be made at the rate of 612 tons in 1961, 645 tons in each of the years 1962 and 1963, and 376 tons per year in the years 1964 to 1970. A fixed price equivalent to approximately 78s. per pound at the mine will be paid by the Atomic Energy Board for these deliveries.

Profits and Dividend Prospects

The Western Reefs and Vaal Reefs mines were previously under contract to supply uranium to the Atomic Energy Board until the end of 1963 and the end of 1966 respectively. These new arrangements will permit both companies to continue to produce uranium until the end of 1970 and place them in a position to compete in the market which, it is hoped, will be developing by that time. The stretch-out of deliveries over the period of ten years will, of course, decrease the rate at which profits will accrue annually to the two companies, particularly during the early part of this period. However, subject to there being no marked change in current grade and cost levels, the total profits to be derived by the Western Reefs and Vaal Reefs companies over the ten-year period from their participation in the joint production scheme should be somewhat greater than the total profits they would have made under their old contracts; and on the basis of current estimates the dividend prospects of both companies are unlikely to be affected by the new arrangements.

The Consolidated Zinc Corporation Ltd., and associated companies announce that as from May 23 next their address will be 6 St. James's Square, London, S.W.1. Telephone WHItehall 5411.

INSPECTOR OF MINES
NORTHERN RHODESIA

Qualifications : Diploma or degree in Mining of recognized School of Mines or University. At least five years' experience, preferably in metalliferous mining industry, including knowledge of underground ventilation practice.

Age Limits : 25-45

Duties : Enforcement of mining and explosives legislation, inspection of mines and accident investigation.

Terms of Appointment : On agreement for one tour (36 months) with prospect of permanent appointment after a probationary period. Emoluments in the scale £1,065-£2,095. Free passages, quarters at rental, free medical attention, generous leave, taxation at local rates.

Apply to Director of Recruitment, Colonial Office, London, S.W.1, briefly stating age, qualifications and experience and quoting BCD.99/3/06/H1.

WESTERN DEEP LEVELS LIMITED

(Incorporated in the Union of South Africa)

DEVELOPMENT RESULTS OUTSTANDING

MR. H. F. OPPENHEIMER'S REVIEW

The following is from the review by the chairman, **Mr. H. F. Oppenheimer,** which has been circulated with the annual report and accounts :—

Start of Production

The recent commissioning of the No. 3 vertical shaft system and the encouraging results obtained in development on the Ventersdorp Contact Reef from the No. 3 shaft have confirmed the expectation that the first stage in opening up the mine will be completed by the third quarter of 1962 when the mine should be brought to production. If development results on the Ventersdorp Contact Reef continue to be as promising and if a sufficiently large orebody can be developed during 1961, production may well commence some months earlier.

The first exposure of the Ventersdorp Contact Reef on the property occurred in March, 1960, when the No. 2 main shaft intersected the reef at a depth of 5,599 feet below surface. The average channel width was 41.50 inches and the average value 7.59 dwt. per ton, equivalent to 315 inch-dwt. This was followed by the exposure of the reef in the No. 2 ventilation shaft at about the same depth, where the channel width was found to be 48.36 inches and the value 10.24 dwt. per ton, or 495 inch-dwt.

At its final depth of 6,354 feet, the No. 3 main shaft was still about 46 feet above the Ventersdorp Contact Reef, so that the reef was not exposed until December, 1960, when it was intersected by the No. 3 ventilation shaft at a depth of 6,413 feet. The reef assayed 11.86 dwt. per ton over a channel width of 34.78 inches, equivalent to 412 inch-dwt.

While work on the No. 3 main shaft was proceeding, use was made of the ventilation shaft to start a crosscut to the north on 66 level which is 6,000 feet from surface. Later, two boreholes were sunk in the vicinity of the shaft on 68 level to test the underlying formation. In July, 1960, one of these boreholes intersected the Ventersdorp Contact Reef at 6,349 feet and disclosed a value of 4.98 dwt. per ton over a true width of 78.8 inches, equivalent to 392 inch-dwt. Soon afterwards, the other also intersected the reef and gave a value of 44.59 dwt. per ton over a true width of 53.2 inches, or 2,370 inch-dwt.

During September, the 66 level crosscut reached the Ventersdorp Contact Reef horizon at a point 1,183 feet north of the No. 3 shaft. Fifteen feet of reef were exposed in the intersection. Here the channel width was found to be 23.83 inches and the value 59.50 dwt. per ton, equivalent to 1,418 inch-dwt. By the end of the year 1,015 feet of reef had been exposed in development from the crosscut. Sixty-four per cent proved payable, with a reef width of 41.68 inches and a value of 16.72 dwt. per ton, or 697 inch-dwt. Over the total footage sampled the average value was 12.78 dwt. and the average reef width 39.15 inches, equivalent to 500 inch-dwt.

These outstanding results have shown that the Ventersdorp Contact Reef in the vicinity of both shafts is well developed and well mineralized and that at No. 3 shaft good values persist over an appreciable area.

Surface Construction

The development that was being done on behalf of this company on 58 level drive east by the West Driefontein mine was stopped in July. The results continued to be relatively poor and water-bearing fissures delayed work inordinately. Of the total of 1,275 feet sampled in 1959 and 1960, only 14.5 per cent proved payable with an average value equivalent to 448 inch-dwt. However, comparatively large areas underlain by payable Ventersdorp Contact Reef are often separated by unpayable areas where reef widths are narrow and lacking in mineralization. The area traversed by 58 level drive east is probably one of these.

A start has been made with work on the second stage of development in which the ventilation shafts will be continued down to the Carbon Leader Reef horizon and the sub-vertical main shafts of the No. 2 and No. 3 shaft systems sunk to provide access to that reef. By the year-end the No. 3 ventilation shaft had reached a depth of 6,564 feet below surface. Preparatory work on the excavations for the headgear of the No. 3 sub-vertical main shaft is proceeding and full-scale sinking operations are likely to commence towards the end of 1961.

The total expenditure on fixed assets since the inception of the company up to December 31, 1960, amounted to £15,540,629, of which £13,750,399 was spent on shaft sinking, development, buildings and equipment. The excess of funds raised, including loans, over expenditure on fixed assets at the year-end, was £780,196. Capital expenditure in 1960 amounted to £5,859,487 and it is estimated that capital expenditure for 1961 will amount to £9,608,000.

The company's authorized share capital was increased on March 31, 1960, from £5,601,000, divided into 5,600,000 "A" shares of £1 each and 1,000 "B" shares of £1 each, to £18,600,000, divided into 5,600,000 "A" shares of £1 each and 13,000,000 "B" shares of £1 each, by the creation of 12,999,000 new "B" shares of £1 each. At the same time, the directors' borrowing powers were also increased from £10,000,000 to a maximum of £15,000,000.

Additional Finance

Subsequently, the company raised £5,600,000 by offering for subscription 2,800,000 "B" shares of £1 each at a price of 40s. per share. Of these, 1,400,000 were offered to holders of "A" shares, registered in the books of the company at the close of business on April 20, 1960, in the proportion of one "B" share for every four "A" shares held and 1,400,000 shares to members of the Loan Syndicate in terms of the company's flotation agreement. The issue of the 2,800,000 "B" shares in May, 1960, was underwritten for a cash commission of 2½ per cent of the issue price. A total of 2,222,872 shares was subscribed for and 577,128 shares were taken up by the underwriters. Each of these 2,800,000 "B" shares carries the right to subscribe for a further "B" share of £1 at a price of 45s. during May, 1961. A circular* will be issued in April, 1961, to the registered holders of "B" shares giving full directions as to how this right may be exercised.

The funds raised to date by the company are now exhausted and Anglo American Corporation of South Africa, Limited, has made temporary loan facilities available pending the outcome of the rights issue in May, 1961.

***The circular was posted on April 21 to the holders of the "A" and of the "B" shares of the company.**

VAAL REEFS EXPLORATION AND MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

HIGHER WORKING PROFITS

DETAILS OF JOINT URANIUM PRODUCTION SCHEME

The following is from the review by the chairman, **Mr. John W. Shilling,** which has been circulated with the annual report and accounts:—

The sinking of the main and ventilation shafts of the No. 2 shaft system was completed in October and the shaft system is now about to be commissioned. When fully commissioned the No. 2 shaft system should be capable of handling 135,000 tons of ore and waste rock per month.

The Vaal reef was intersected in the main shaft of the No. 2 shaft system during January, 1960, at a depth of 4,880 feet and gave values equivalent to 819 inch-dwt for gold and 42.41 inch-lb. for uranium. The ventilation shaft intersected the Vaal reef at a depth of 4,905 feet in May, 1960. Here the reef carried values equivalent to 473 inch-dwt for gold and 10.22 inch-lb. for uranium.

The extension to the reduction plant that will increase the rated capacity from 100,000 to 125,000 tons per month should be completed by April, 1961.

In anticipation of the commissioning of the No. 2 shaft system, development south of the Kromdraai fault off 50.1.S.E. and 53.1.S.E. haulages was pushed ahead with encouraging results. In this area 84.3 per cent of the reef development sampled proved payable with average values equivalent to 756 inch-dwt for gold and 58.464 inch-lb. for uranium. In the No. 3 joint shaft area, 86.8 per cent of the footage sampled was found to be payable, the average gold value being equivalent to 714 inch-dwt and the uranium value 45.778 inch-lb. Lower values were encountered in the No. 1 shaft area where 66.2 per cent of the footage sampled proved payable with values equivalent to 475 inch-dwt and 36.046 inch-lb. The total footage developed and sampled in all sections of the mine compared favourably with the figures for 1959. Although the payable percentage of total footage sampled was slightly less than in the previous year, there was an improvement overall in both gold and uranium values.

Ore Reserves Increased

By the year-end the ore reserves had been increased by 375,000 tons to 3,325,000 tons at an average gold value of 9.86 dwt and an average uranium value of 0.797 lb. per ton.

On surface, 638,522 tons of uranium-bearing slimes have been accumulated and are paddocked separately on the slimes dam. These have an average uranium value of 0.851 lb. per ton and represent the accumulated excess of residue slimes over the quantity used in the past to produce the company's uranium quota.

As a result of the record tonnage milled and the slight but welcome improvements in the average yield and in the average price realized per ounce of gold produced, the working profit from gold at £2,880,891 was £278,304 higher in 1960 than it was in 1959.

In 1960 the estimated profit from uranium also increased by £36,202 to £1,695,066.

The surplus for the year carried to the appropriation account was £4,621,763. With the unappropriated profit of £228,935, this brought the total available for appropriation to £4,850,698. Appropriations for capital expenditure absorbed £2,764,573. Unchanged dividends of 3s. 6d. per share involved the distribution of £1,837,500 and £6,262 was applied to meet an adjustment in taxation. The unappropriated balance of £234,363 was carried forward.

Joint Production Scheme

Capital expenditure for 1961 is estimated at £1,519,500. The company's assessed loss for tax purposes at December 31, 1960, was estimated at £2,934,000. The company may enter the tax paying stage in 1961, but the full impact of tax should not be felt until 1962. Provided production can be increased as planned, the advent of tax should not have an adverse effect on dividends.

The Vaal Reefs and Western Reefs companies have acquired, on a royalty basis, certain annual quota entitlements from other producers with the approval of the Minister of Mines. Their combined annual quota entitlements, now amounting in all to 4,534 tons, are to be produced over the ten-year period 1961 to 1970 inclusive, in a joint production scheme set up by the two companies with effect from January 1, 1961. Delivery of the 4,534 tons is to be made at the rate of 612 tons in 1961, 645 tons in each of the years 1962 and 1963 and 376 tons per year in the years 1964 to 1970. A fixed price equivalent to approximately 78s. per pound at the mine will be paid by the Atomic Energy Board for these deliveries.

Atomic Energy Board Loans

In addition, certain loans will be made by the Board to the Vaal Reefs and Western Reefs companies in respect of deliveries of annual quota entitlements that are being spread over the ten-year period. These loans will enable both companies to meet their uranium loan instalments on due date. The loans from the Board will be repayable from 1966 onwards.

A pipeline will be laid between the Vaal Reefs and the Western Reefs uranium plants and the Vaal Reefs uranium plant will then be closed down. The residue slimes from the Vaal Reefs gold plant will be pumped across to the Western Reefs uranium plant where the quota production of the joint production scheme will be produced on the most economical basis, utilizing residue slimes from both mines.

The pipeline should be completed in the second quarter of 1961.

Dividend Prospects

The Vaal Reefs and Western Reefs mines were previously under contract to supply uranium to the Atomic Energy Board until the end of 1966 and the end of 1963 respectively. These new arrangements will permit both companies to continue to produce uranium until the end of 1970 and place them in a position to compete in the market which, it is hoped, will be developing by that time. The stretch-out of deliveries over the period of ten years will, of course, decrease the rate at which profits will accrue annually to the two companies, particularly during the early part of this period. However, subject to there being no marked change in current grade and cost levels, the total profits to be derived by the Vaal Reefs and Western Reefs companies over the ten-year period should be somewhat greater than the total profits they would have made under their old contracts; and on the basis of current estimates the dividend prospects of both companies are unlikely to be affected by the new arrangements.

The Canadian Institute of Mining Medal for Distinguished Service is awarded this year to E. B. Gillanders, " for outstanding success in the development of uranium mining in Canada ". Dr. Gillanders is a member of the Geological Association of Canada, the Society of Economic Geologists and the Ontario Association of Professional Engineers as well as the C.I.M. Recently he was elected president of the Canadian Metal Mining Association.

GEOPHYSICISTS :
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

2 pensionable posts (graded as Geologist or Senior Geologist) in Geological Survey and Museum, London, for men at least 21 on 1.7.61. Duties are concerned with geophysical surveys in the field. Candidates should normally have (or obtain in 1961) 1st or 2nd Class honours degree in Geology, Geophysics, Physics, or Mathematics, together with a university qualification to at least first year standard in Geology and in Physics or Mathematics, or an equivalent qualification. Experience in Applied Geophysics an advantage. At least 3 years' post graduate or other approved experience necessary for appointment as Senior Geologist. Inner London salary within the scales £793-£1,282 or £1,402-£1,719, according to age, qualifications and experience. Starting pay may be above minima. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London, W.1 for application form, quoting *S/5298/61*. Closing date May 18, 1961.

LONDON METAL AND ORE PRICES, APRIL 27, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 9¼d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram
Magnesium, 2s. 2¼d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28½
Quicksilver, £67 ex-warehouse
Rhodium, £43/£45 oz
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79¼d. f. oz. spot and 80d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	27s. 0d./32s. 0d per unit c.i.f.
Beryl (min. 10 per cent BeO)	270s./275s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
„ Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
„ Refractory 40%	£11 0s. 0d per ton c.i.f.
„ Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb_2O_5 : Ta_2O_5	165s./170s. 0d. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£25 10s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	119s. 0d./123s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16 ton c.i.f